THE

# Practical Teacher

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'*Knowledge is proud that he has learned so much,*
*Wisdom is humble that he knows no more.*'—COWPER.

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## The Teacher's Health.

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### II.—DIGESTION AND ITS DERANGEMENTS.

THE food which nature requires is derived in the first instance from the vegetable kingdom; vegetable food alone, if properly arranged, is sufficient for all the requirements of animal life. It will sustain human life until old age, and gives all the forces necessary for its perfection. It is doubtful whether the flesh of animals alone can do so. Those who live entirely on animal food suffer from maladies from which the vegetable feeder is free. The quantity of animal food which can be taken with impunity is therefore limited; whilst those who abstain from a vegetable diet suffer from diseases of a very serious kind, especially the class which is styled scorbutic, of which scurvy is the type. Eruptions of various kinds disfigure the skin, the bones are defective in toughness and strength, the teeth decay early, and the nervous system fails in vigour. There may be a doubt as to the propriety of a purely vegetable diet at all times and at all seasons. The form in which the elements exist in vegetables which are necessary for the maintenance of life is not always capable of being easily burnt up in the system, so that there may be a loss of power in bringing the correlation of force into effect, and by means of which chemical action may become vital energy. The loss may be so great as to impair the efficiency of the machine, if it is not provided for. This is manifest in very cold seasons, in which animal fats are voraciously eaten by those accustomed to them, and even those whose stomachs used to rebel at fat are able to digest it with ease in Arctic climates. Experience, therefore, teaches us that animal diet is most useful in cold regions. It is required, even in temperate climates, for the maintenance of muscular power and the continuance of muscular exertion; whilst the health is kept up more satisfactorily in the warmer latitudes by those who limit the quantity of their meat food, and live mainly on fruit and vegetables. If there is muscular work to be done, meat food may be consumed with impunity, nay, it is required in this country; but those who labour with the brain only, or who live a sedentary life, will do better if they let the meat alone in hot seasons, and only indulge moderately in flesh food in hot climates. The reason for this is not far to seek, for although man is especially an omnivorous animal, he is so because he is intended to live in all parts of the globe. Science and experience teach him that the loss of heat from the body is small under the equator, that the consumption of carbon for the maintenance of animal heat is not so necessary, but in the more temperate climates and colder regions the consumption must be greater to enable the body to keep up the animal heat at the normal 98·5 Fahr. For whether at the equator or in Greenland the human temperature is always about the same, seldom varying, in health, more than one degree. Now, animal food contains a much larger percentage of material available for heating purposes than does a similar weight of fruit or vegetable food. The action of cold is to check evaporation. The action of warmth is to increase it. The skin and the bronchial mucous membrane give out water, more or less, according to the temperature and moisture of the air. Fruit and vegetables contain a much larger percentage of water in combination with the elements C. H. O., which go to make up the mass of food. It is ready to meet the demand in the one case, whilst it is not wanted in the other. The chemical changes which take place allow of the production of a much greater quantity of heat from a given weight of meat than from a similar weight of mixed vegetable diet. This is less manifest in the case of wheat and other farinaceous foods than with green foods or fruits, because starchy foods have a maximum of carbo-hydrate and a minimum of water in their constituent elements; but man cannot live on starch and its analogue, sugar, without suffering in a way allied to those conditions which arise from a nutriment mainly derived from animal products. The disturbances to health are allied to, but are not the same as, those caused by excess of animal food.

The growth of the body, and the uses to which it is put, together with the temperature of the region inhabited, or the time of year, regulate the demand for food. This demand must be considered by those who have to provide the supply, and indicate a necessity for a properly mixed diet. All persons require more



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vegetables and fruit, which will provide more watery elements for the use of the skin, in the warmer periods of the year; whilst in colder seasons, the supply of meat and other animal food, such as butter and fat, must be provided in larger quantity. They will require a change of food, according to the season. To give them the same kind of diet in a wet season, when the air is always damp, and the skin scarcely acting at all, as is provided in a dry east wind, or in hot seasons, when every particle of moisture is taken up by the air, is altogether a mistake, and must put the animal machine out of gear. Abundance of water and vegetable food in greater quantities must be provided if children, as well as adults, are to be kept in health. If their stomachs are loaded with fat food in warm and damp seasons there will be a tendency to bilious derangements and loss of healthy appetites. The quality, the quantity, and the kind of food must be considered in relation to the habits of the person, the place in which he lives, and the time of year, as to moisture and dryness, heat or cold. The first evidence of a disturbance of the digestive organs is styled Dyspepsia or Indigestion. Children often suffer from this disorder from various causes besides those mentioned above. Perhaps the most frequent cause is eating too much food at one time, swallowing it too rapidly, and without masticating it properly. This fault is not limited to young children, for teachers are themselves frequently guilty of the same fault. They are hungry, and the time for feeding is limited, while food requires to be masticated properly, so that it may be ready for digestion when it reaches the stomach. The saliva must be mixed with the food to prepare it for further action lower down. Nitrogenous food is comminuted only in the mouth. In the case of starchy food, the saliva changes it into dextrine, a form which enables it to become sugar as soon as it passes into the circulation, which it does when it has been mixed with secretions from the pancreas and some glands found in the mucous membrane of the intestinal wall. All farinaceous food changes into sugar before it can be used up in the body. After this mixture, starch becomes soluble and diffusable, and passes rapidly into the blood. If the saliva is not properly mixed with the starch it does not change as quickly as it ought, and is not so quickly removed from the alimentary canal; indeed, some will pass away undigested, and its feeding power is lost. Nitrogenous matters, such as fibrine, albumen, and caseine, are changed into albuminose by the peptones of the stomach. By these peptones fibrine is dissolved and does not again solidify. Albumen is transformed and becomes uncoagulable; caseine is solidified, and is then re-dissolved. To effect these changes two principles are indispensable, viz., pepsine and an acid. These principles must be in proper proportion, according to the quantity and quality of the food taken. The secretions of the pancreas and intestinal glands are alkaline, and counteract the changes which the gastric acid has produced, enabling the bile acids to perform their functions and to do their portion in the process of digestion. Metamorphosis of food is thus necessary to enable it to be suspended or dissolved. The fats are emulsified by glandular secretions, and are fitted for absorption and diffusion through the circulation. Nitrogenous food and fat are of the greatest importance when either muscular or nerve force is required, whilst starch, sugar, and fat are required for the development of heat and its maintenance at a healthy standard. Defective mastication promotes dyspepsia, so does the use of those materials which destroy the balance of power in the stomach. Mastication is often defective from the condition of the teeth themselves. It is so whilst children are cutting their second teeth, and even when the wisdom teeth are piercing the gums a similar condition may arise. If food is swallowed in large lumps, the action of the stomach is not sufficiently active to break them down, and they pass into the intestines and set up irritation there, from flatulency consequent upon fermentation and other disorders. The action of the stomach may be likened to a pair of millstones—the food is ground up by muscular attrition; the gastric juices are then enabled to act more easily. Irregularity of time at which food is taken disturbs the power of the stomach. If the interval between each meal is too long, there may be want of digestive power; whilst, if it be taken too often, the stomach is never properly empty and healthy hunger never arises. These mistakes should be always avoided. Three meals are sufficient for healthy children above nine years of age, whilst younger children require food at more frequent intervals, because the muscular power of the stomach is not equal to the disintegration of strong meats, and absorption is correspondingly more rapid. The more soluble and the more liquid the food taken, the oftener the stomach should be supplied with nutriment. If the stomach is overloaded there is disturbance, as also if food of that nature is taken which will not allow of its disintegration. Indigestion may have many sources. Whatever destroys the balance between secretion and the food to be digested sets up dyspepsia. Mental disturbances will interfere with appetite. A man comes in from a long walk, by the aid of which appetite has been excited; he is ready for a good dinner; he opens a letter containing bad news, and his appetite is gone, and if food requiring disintegration be taken it will not be properly digested. So a child may have a serious attack of indigestion in consequence of some fear of impending punishment.

Sedentary occupations by taking away the purifying agency of exercise and allowing the unconsumed carbon to be deposited in different proportions in different organs of the body is a fruitful source of indigestion; when too much carbo-hydrogen food has been taken, it seriously promotes indigestion among the great body of teachers. If a teacher suffers from indigestion and falls back upon medicine, especially aperient doses, for his relief without remedying the evil which has set up his malady, he is placing himself on the high-road to ill-health. Depend upon it, indigestion cannot be remedied by medicine. The first cause which has set up the disturbance must be removed before the effect will cease. If food of the wrong kind, or in too great a quantity, is habitually taken, the error must be rectified. If exercise has been avoided, it must be sought for; if too small a quantity of liquid has been consumed to dissolve the effete salts in the body, and to pass them out by the proper emunctories, that error must be removed, and more liquid taken, because one of the results of life is to produce effete salts, which are the sequences of chemical action; these sequences must be dissolved and washed away.

Spirituous liquors and alcoholic drinks of all kinds are serious causes for this malady. They precipitate the peptones and destroy the balance of power in the

stomach, whilst they apparently increase the gastric secretion by inducing an unhealthy congestion of the gastric membranes. Narcotic drugs and tobacco lead to the same end; they produce deficiency or excess of gastric juice, and are certain, if habitually used, to lead to trouble. Acidity, whether of the gouty or rheumatic kind, may be removed temporarily by ant-acids, but the real cause for the acidity must be searched out and rectified. If it is a gouty acidity, such as is called the lithic acid diathesis, and which is shown by excess of urea and highly acid urine, with deposits as the latter cools—if there is flatulency and heartburn, and general gastric uneasiness, potass salts may remove present cause, but nitrogenous food must be discontinued to a large extent, and more water taken, so that the diathesis must be changed. The ordinary water consumed should have a minute quantity of mineral saline in its constitution, so as to encourage a looseness of the bowels. If the tendency is to the rheumatic or lactic acid condition, a similar course must be followed, together with a temporary abstinence from those conditions which lead to a lactic acid formation. These are especially promoted by malt liquors and excess of vegetable food. The constipation which so often accompanies dyspepsia must be got rid of by a proper regulation of diet, and not by taking aperient medicines. If the latter course is followed it is sure in the long run to produce a very serious evil. Those derangements which in the first instance are only functional will become organic, and the difficulty of cure will then be multiplied a hundred-fold. The human system is very like a steam-engine with a thousand tubes in its structure. If an impure water is used some tubes are soon blocked up in the engine by the *débris;* and so are the different emunctories of the body, when too much or a wrong kind of food is taken. Some carbonaceous material is kept back, and the system is fouled. Sedentary occupations, such as teaching, tend very much to this kind of fouling. A man sitting in his chair for an hour gets rid of so many cubic inches of $CO_2$, according to the capacity of his lungs. The inspired air will contain four parts of $CO_2$ in 10,000, but the expired air should contain from two to four per cent. If the man walks a mile, the quantity of $CO_2$ which is passed out of the body is doubled; if he walks two miles in the same time it is increased threefold; if he walks five miles it is increased six-fold, hence the purifying and warming effect of exercise. If a man takes much carbo-hydrate into his stomach he must take exercise to free himself from its *débris*, and if he does not he gets fatty liver or some other fatty state which destroys his health and happiness. If he eats more food than the juices of the stomach can act upon, the undigested matter passes down, and undergoes unhealthy changes in the stomach, which an aperient may carry away for that time; but if he repeats the offence he is soon in the same condition again, and the same dose of aperient will either fail in its effect or irritate the mucous membrane of the stomach, and so still further damage the organ. Abstinence from food in such a case, and then a change in its quality, will be much more efficacious than physic.

Indigestion is not to be cured by whip and spur; the use of alcohol, mustard, peppers and gingers, and such-like aids to digestion are in the wrong direction—they may relieve a present state of flatulency caused by painful fermentation, but they do not remove the cause, and if persevered with, because they give present relief, they will tend to promote a thickened state of muscular tissue in the stomach itself, and perhaps bring on incurable disease.

If there is a very loaded state of the stomach, as indicated by foul tongue, perhaps headache, loss of appetite, and a feeling of distension, especially if it has been caused by an overdose of food, an emetic of ipecacuanha may give immediate relief; but one cannot do like the old Romans, take emetics every day so as to enjoy the pleasure of eating again; but such a course would be much safer than flying to a blue pill and black draught, which is a favourite remedy with those who wish to remove the present distress without going to the fountain-head, and getting at the cause of the evil itself. Equal parts of blue pill and compound rhubarb pill in ten grain doses, taken at bedtime, may be advantageous in some abdominal disturbances in which it is necessary to take away a present load; but to go on taking such doses will only end in a break-down of digestive power altogether, or the earlier production of hæmorrhoids or piles, as they are commonly called, and so lay the foundation for much discomfort and suffering.

Those who inherit a strong lithic acid or gouty tendency may take a daily dose of some mineral saline aperient, such as Carlsbad or Cheltenham salts, in a tumbler of warm water early in the morning, especially if they are inclined to obesity; whilst they who are filled with flatus, and have acid eructation, will do best with a charcoal biscuit or two, and the avoidance of flatulent vegetables, pastry, and broths.

Indigestion may arise from deficiency of bile as well as excess; for those conditions it is the custom to take mercurials. It is evident that a bilious condition cannot be an antibilious state, and yet both conditions are often treated alike. It is not good practice to whip a liver which is already loaded with too much bile. It is much more sensible to cut off the supply of nitrogenous food, whilst if there is a defect of bile, exercise will bring out a condition which will allow of the digestion of those matters which tend to bring the bile acids into activity, and get them excreted into the alimentary canal. Spare and emaciated dyspeptics, who cannot digest fat, should set themselves to overcome this evil. They cannot cure their dyspeptic state by avoiding all things which apparently disagree with them. They must clear their emunctories of the *débris* which oppresses them. They must see that the air they breathe is free from excess of $CO_2$, so that the air they draw into their lungs is not already provided with the excretion which it is called upon to remove, and they must also take care that the skin is in a state to assist in the proper purification of the body. The balance of order in the secretion of the digestive juices has been disturbed. This balance must be brought back again by a purifying process before the saliva takes on an alkaline reaction, the gastric juice has its complement of acid, and the secretion of the pancreas and mucous glands the alkalies which are wanted for healthy digestion.

*(To be continued.)*

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# How I Teach Latin.

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*(Continued from page 4.)*

HAVING taught children how to distinguish between substantive and adverbial English infinitives, as explained at the end of the former portion of this article, I proceed to those uses of the Latin subjunctive which are translated into English by means of an indicative mood. Hence we get laws with regard to condition, consequence, prevention, etc., etc.

After this I attack the relative. To do so, I explain that a relative is a compound of a conjunction and a demonstrative pronoun—*i.e.*, that 'qui' is really 'que' (and), 'is' (he)—and I make them turn every sentence with a relative in it into the same idea expressed by means of a conjunction and a demonstrative pronoun; *e.g.*, 'Cæsar, who had conquered the Gauls, went afterwards to Briton;' they would read out, 'Cæsar, and he,' etc. Now this 'he' is evidently the subject of the subordinate clause; the pronoun 'qui,' therefore, must be put into the nominative case. Again, 'The mother, whom her son loved, died happily,' becomes, 'The mother, and her son loved her,' etc. Now here 'her' is evidently the object of the verb 'loved,' and must therefore be the accusative case of the relative pronoun 'qui.' So also with all the other cases. If the conjunction implied in the relative be 'ut' (that), the verb of the relative clause is put into the subjunctive mood; thus, 'He sent men who should fetch water' becomes 'He sent men that they might fetch water,' where the 'qui,' or rather the 'ut' implied in the 'qui,' is followed by the subjunctive. If the relative do not refer to the whole of the antecedent, but is used in a partitive sentence, the verb of the relative clause is also put into the subjunctive mood; *e.g.*, 'There are some who love themselves,' really means, 'There are (men) some of whom love themselves,' where the verb in relative clause is in the subjunctive mood.

After this would come the forms of the passive voice which are readily derived from the corresponding active ones. And after the tenses formed from the first roots are mastered, the verb 'esse' (to be) must be built up in its entirety, though two or three forms of it may have been introduced before. Then we are obliged to learn the participles. It ought to be carefully pointed out that out of six possible participles, viz., past, present, and future in both voices, the Latins have only four, and the other two are supplied by 'quum,' with a subjunctive tense or a form of expression (very little used in English) called the absolute case. This would require some little time to be spent over it, and a copious set of examples to be given.

Next, to master the verbal noun or gerunds. The verbal noun, which is always neuter, is really thus declined; *e.g.*, Videre, to see:—

Nom. Videre { the act of seeing / the sub. of sentence } { or Videndum, / the necessity of seeing.
Acc. Videre { the act of seeing / the obj. of verb } { or Videndum, the act of seeing (used after a preposition).
Gen. Videndi, of seeing.
Dat. Videndo, to or for seeing.
Ab. Videndo, by or from seeing.

Hence 'Jucundum est videre' means, 'The act of seeing is pleasant,' or, 'It is pleasant to see.' But 'Pueris videndum est' means, 'The necessity of seeing is for boys;' that is, 'Boys must see.' Or, 'Romam non eundum est' ('We, or you, must not go to Rome'), the subjective pronoun in Latin being always omitted with these verbal nouns. In connection with the gerunds, or oblique case of the verbal noun, we must draw attention to the idiomatic use of the future passive participle; *e.g.*, 'Studiosus est Ciceronem audiendi' and 'Studiosus est Ciceronis audiendi' are equally good Latin, and mean exactly the same thing, viz., 'He is fond of hearing Cicero.' In the first case the audiendi is the genitive of verbal noun, followed by the direct object, Ciceronem; and in the second case the audiendi is the genitive case of future passive participle, agreeing with Ciceronis, and literally means, 'Of Cicero about to be heard.' As I said above, this is 'idiomatic,' and must be accepted as such, but requires careful notice and a good many examples.

This seems the place, rather than earlier, to draw attention to the verbs that seem to have their direct objects in the dative or other cases, as envy, spare, use, pity, etc.; but on examining these the objects are found to be not really direct objects, and if the verb be split up into its constituent parts of a noun coupled to action, this will readily be seen; *e.g.*, 'I pardon Caius' really means, 'I grant a pardon to Caius,' where 'Caius' is the indirect object of 'grant.' The same might be said of the ablative case which is found after utor. 'Utor Equis,' which means, 'I use horses,' really means, 'I do something with the aid of horses,' where 'horses' is the instrument, and therefore naturally put into the ablative case. Or again, the genitive after verbs of remembering, pitying, is really a partitive genitive, which will readily be perceived on a little reflection. I always find that if a boy can realize any possible reason for a seeming exception he is far more likely to remember that so-called exception. Again, with regard to certain passive verbs being only used in an impersonal way, the difficulty soon vanishes if a direct and indirect object of an active verb is understood. An indirect object of an active verb cannot, in Latin, become the subject of the corresponding passive verb. The indirect objects, then, of those verbs which seem to govern an accusative case, as envy, spare, etc., remain indirect objects of the passive verb, and the direct object, that is the noun implied in the verb, called the cognate accusative, is the real subject of the passive verb. Hence the passive verb is found in the third pers. sing. and is said to be 'impersonal.' Thus, 'Ignosco tibi' means, 'I pardon you.' To render the same idea in the passive voice, or 'You are pardoned by me,' the Latins put, 'Pardon is granted to you,' or, 'Tibi parcitur.'

To mention another difficulty, Latin writers are as fond, as our modern newspaper reporters, of giving not the actual words of the speaker, but the gist of what he says, thinking, no doubt, that thus they save time and space. Unfortunately, Cæsar is a writer who always reported speeches in this way, thereby rendering some of his chapters extremely difficult for those first beginning the study of Latin. This method of writing speeches is called the 'oratio obliqua,' and in it we find, as we should expect from what has been said above about substantive co-ordinate clauses, that all the principal verbs are in the infinitive mood; but not only

are all the verbs of the causal subordinate clauses (as we should find them in the 'oratio directa'—*i.e.*, the verbatim report of speeches) in the subjunctive, but also all the verbs of the adjective subordinate clauses (generally relative), and temporal and others, are put into the subjunctive mood. Grammarians from the earliest days have all been trying to formulate rules for the use of the subjunctive under all circumstances; but the best of them generally acknowledge, at the end of their most exhaustive remarks, illustrated by many examples from the best writers, that no one now seems to be in a position to explain the reason of every subjunctive found in the classics. All that one can hope to do, then, is to teach lads when they may venture to use the subjunctive without being wrong, even though they are retranslating a passage in which the indicative was originally used. Some teachers have been so anxious to reduce the use of the subjunctive to one idea—*e.g.*, 'the region of the mind' in opposition to 'the region of fact'—that they have often pressed it beyond all possible limits. The formation of a grammar must be an inductive process, and the moment a teacher allows his mind to take hold of an idea to which he twists and turns all that he examines—even against his better judgment—he is bound to fail. No doubt the subjunctive mood was generally used in a sentence which gave the reason, or the purpose, or the result of the action of the principal sentence, unless such reason, etc., for the action be very definite; and even when the subjunctive is found in a temporal clause one can generally trace some implied reason, purpose, or result which ought—to make the translation perfect—to be in some way implied in the English rendering; *e.g.*, in 'Alexander, quum interemisset clitum, vix manus a se abstinuit,' the 'interemisset' really expresses the reason why he could not 'keep his hands off himself,' and the 'quum,' though primarily a temporal conjunction, has also an implied causal meaning, and therefore followed by the subjunctive.

No one who has studied more than one or two languages—even though one of them may be his native tongue—can have failed to notice that the irregularities are always found in the more common words. The reason of this is plain—viz., that the more common a word is, the more will it be used by the uneducated, and these will have their own way, and make of the word, what they will. Latin idioms and methods of expressing dates, prices, distances, weights, etc., ought to be learnt gradually. It is a good habit for a boy always to put the date on which he writes his exercise on the top of it in Latin.

Finally, it must, alas! be pointed out to every student of Latin that, strange as it may seem, we really know very much less about Latin, with all its subtle meanings, than we know of Greek. To take an example, the order of the words of a sentence in Greek—though a matter of very considerable importance—is to be mastered without much difficulty; but the order of the words of a Latin sentence is a matter probably unknown in its entirety to any late student of Latin. Give a boy almost what rules you like as to the order of a sentence, and the probability is that before he has read another five pages of his Latin author, whoever it may be, every one of those rules will seem to have been broken.

After a boy has built up his grammar and learnt to translate with fair fluency, the best Latin prose he can do for a long time is a retranslation of a good English version of any of Cicero's Orations, or even of some bits of Livy or Tacitus.

To recapitulate in a few words, Let a boy build up his own accidence; let him master the use of the cases, and the tenses, and the moods, and then try to find some reason for any seeming exception; and the whole subject will become a source of constant interest, rather than a weary task to be got through, just to save the half-holiday from being lost, or even the body from being caned.

*(To be continued.)*

## Physiology.

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### CHAPTER II.

WE have seen in the last chapter that life manifests itself through the medium of a complex albuminoid material called protoplasm; and in the Amœba we have seen a minute particle of protoplasm existing by itself, and carrying on all the functions of a living creature.

Now, suppose we had two such Amœbæ connected together, and that instead of each of them performing all the functions necessary for the continuance of life, one Amœba should perform half these functions and the other perform the other half. Each Amœba now having only half as much to do, would be able to do it more perfectly. And if we imagine that, instead of two Amœbæ aggregated together, there were six, and that each of these performed only one of the functions which we saw the Amœba was capable of, it is plain that each one, having only one thing to do, would be able to do it more thoroughly and perfectly than if it had six things to do.

The same principle is illustrated in everyday life. It is often said that the 'Jack-of-all-trades is master of none.' The tailor makes a very poor shoemaker, and his incompetence will show itself still more markedly if he has likewise to be grocer and farmer.

It is true that the one-celled Amœba performs all the functions necessary for its well-being with wonderful facility. But these functions are very rudimentary, and so when more special and complicated functions are required, we find that special cells are set apart for special duties: a physiological subdivision of labour occurs, and so each kind of work is better done. One set of cells (each cell very much like our tiny Amœba) is specially devoted to digestion, another to respiration, another to sensation, and so on.

And this physiological division of labour is carried still further in the higher animals. Thus many different processes go on during the digestion of food; and so we have one set of cells secreting saliva, and that only; one set secreting gastric juice, and that only; another set of cells secreting pancreatic juice, and that only.

All the tissues composing the human body take their origin from little masses of protoplasm (called *cells*), very like the tiny Amœba. These tissues, when formed, are very various in appearance and in properties, having been modified to suit the special re-

quirements of the part of the body in which they are found. You know that the house you live in is made up of timber, bricks, mortar, glass, stone, and other materials. In a similar way, the human body is made up of the various tissues. The chief of these tissues are bone, muscle, cartilage, fibrous tissue, fat, and nervous tissue.

Now, the tissues of the body are built up into *Organs*, several tissues always entering into the composition of an organ. An organ is a part of the body which has a special function to perform in the animal economy, and the office which is performed by each organ is known as its *Function*. Thus, the stomach is an organ whose function is to digest albuminous food; the liver is an organ having several functions, namely, the secretion of bile, the formation of glycogen, and the modification of the blood. You will at once see that in Physiology we are especially concerned with the study of the *functions* of the various organs of the living body.

Now, while the tissues of the body combine to form the different organs, the tissues themselves can be analysed into various *proximate principles*, as they are called. These proximate principles do not exist as such in the body, but are obtained by chemical means from the tissues. Thus, if we boil a piece of bone we obtain some gelatin, known by its being liquid when hot and becoming solid on cooling. But the gelatin did not exist as such in bone, but as distinct fibres and cells. Similarly, chondrin is obtained from cartilage, myosin from muscular tissue, and so on.

Each of these proximate principles has a definite chemical composition, and can be analysed into certain *ultimate elements*. Thus, glycogen consists of the three elements—carbon, hydrogen, and oxygen, united into a complex molecule of twenty-one atoms ($C_6H_{10}O_5$). Gelatin, albumen, myosin, etc., contain these three elements, with the addition of a definite amount of nitrogen. Sulphur, or phosphorus, or both, are always present in the nitrogenous substances of the body, but in very much smaller quantity than the four other elements named. Besides these elements, chemical analysis shows that there are in the body small quantities of silicon, chlorine, fluorine, sodium, potassium, calcium, magnesium, iron, and probably traces of manganese and copper. Of course, these elements do not exist as such in the human frame, but either in the form of salts or worked up into the composition of the complex organic constituents of the body.

From the above, you will see that we have in the human body—

1. Organs, composed of
2. Tissues; these consist of
3. Proximate principles, and these of
4. Certain ultimate elements.

Returning for a short time to the *organs* of the human body, it is interesting to note that we may classify them into—1st, those which are open to the external world; and, 2nd, those which form closed cavities. The skin forms the outer covering of the body, and puts it in relation with its surroundings; but we may consider all the mucous surfaces, such as that of the mouth and alimentary canal, as prolongations inwards of the skin. Suppose I had a lump of dough, and made a canal in it at one side by pushing in my finger. This would give you some idea of the windpipe leading from the back of the mouth to the lung. If you imagine the end of the tube to be divided into a number of smaller branches, you would then have a representation of the branches of the windpipe in the lung. And yet all these different branches open on to the external surface by means of the large tube, and they are all outside the mass of dough, as you will see by referring to Fig. 2. So that we may say the mucous surface of the windpipe and lungs is outside the body.

Fig. 2.

Similarly, the whole of the alimentary canal, including the gullet, stomach, and intestines, is outside the body.

On the other hand, we may instance the heart as an organ which nowhere leads to the free surface of the body. Veins bring the blood to the heart, arteries carry it away, and small capillary vessels connect the arteries and veins, but nowhere is there a break in the continuity of these three sets of closed tubes or vessels.

What we have said already will give you a general idea of the tissues and organs entering into the composition of the body. Let us now take *a general view of its build*, and after that of its functions.

First, with regard to the build of the body. The most obvious division of the human body is into head, trunk, and limbs. Let us examine each of these, taking the *trunk* first of all.

Fig. 3.
View of a Dorsal Vertebra from above.

The trunk is supported throughout its length by a central axis of bone, called the *vertebral or spinal column*, which runs down the back through its whole

length. This vertebral column is not one single bone, but consists of a number of thick bones called vertebræ, the shape of which varies in different parts; all agree in having a thick part in front called the *body*, and an arch springing from this behind. Fig. 3 represents a vertebra from the middle of the back.

The bodies of the vertebræ rest on one another, while the arches lie over each other, and thus produce a continuous canal in which the delicate spinal cord securely rests. In the dorsal region there are twelve ribs attached to each side of twelve vertebræ. These arch forward, and the upper seven of them are fixed to the breast-bone in front. Thus is formed a second or anterior arch corresponding to the posterior arch formed by the arch of the vertebræ. Only seven ribs join in front to form this anterior canal. The rest of the canal is formed by flesh, whereas the posterior canal is encased in bone throughout its whole length. The anterior canal is called the ventral or *haemal*, (hæmal, because it contains the heart and most of the blood-vessels); the posterior canal is called the dorsal or *neural*, (neural, because it contains the main part of the nervous system). Fig. 4 shows a transverse section of the body, and will enable you to see at a glance the two tubes, and the way in which the bodies of the vertebræ form an axis on which they are both supported.

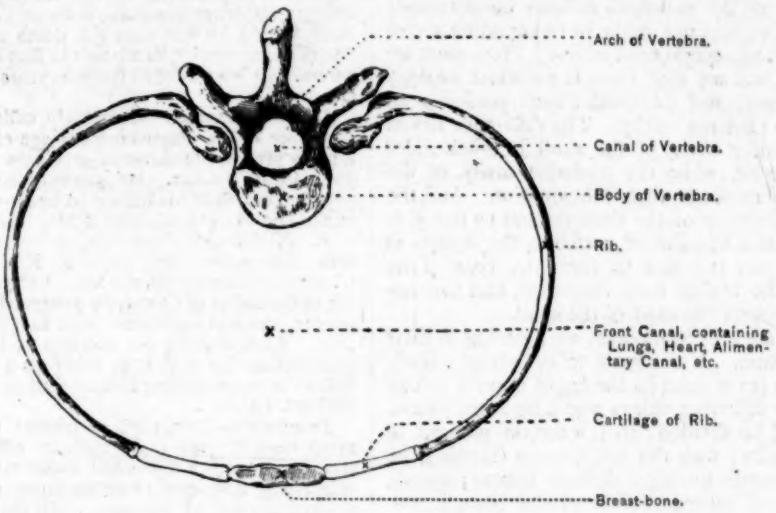


Fig. 4.

This *double-tube structure* is characteristic of animals with a backbone, and by means of it you can at once place any animal into its proper class. It must be a *vertebrate*, *i.e.*, a backboned animal, like fishes, frogs, reptiles, birds, and mammals; or an *invertebrate* animal, *i.e.*, an animal without a backbone, like oysters, mussels, insects, lobsters, worms, etc. The posterior or neural canal of vertebrate animals contains the spinal cord, but invertebrate animals, not possessing this canal, have no spinal cord.

The front cavity of the body (or hæmal canal) is divisible in man into two parts, an upper and a lower, separated from each other by an arched muscular partition called the diaphragm or midriff. The upper cavity is called the *Thorax*, or chest. Its chief contents are the heart, the two lungs, and the gullet, which runs along the back of the thorax to pierce the diaphragm and join the stomach.

The lower cavity is called the *Abdomen*, which contains the stomach and intestines, with their diverticula, the liver and pancreas, also the two kidneys, the bladder, and the spleen. The lowest part of the abdomen is generally called the *pelvis*, and here the organs are safely protected in a bony, basin-like cavity.

The *Head* rests on the top of the vertebral column, the highest vertebra being called the *atlas*, because it

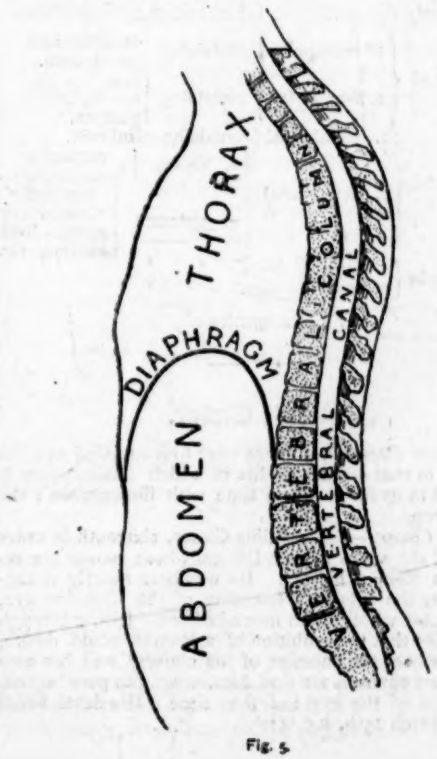


Fig. 5.

bears the head, as Atlas, of ancient story, was supposed to bear the world. The head, like the trunk, may be divided into two great cavities; 1st, the *cranium*, which contains the greater brain (cerebrum), and the lesser brain (cerebellum); and 2nd, the *face*, which contains the cavities of the nose and mouth, and the upper part of the gullet. At the base of the skull is a large opening (called the *foramen magnum*, or great opening), and this opening fits over the upper end of the spinal canal. In this way the interior of the skull and of the vertebral column communicate with each other; and the brain in the cranium above here joins with the spinal cord below. From what we have said you will see that there is a distinct analogy between the head and the trunk; each possesses an anterior and a posterior cavity. The difference lies in this—the posterior cavity of the skull is much wider than the anterior, while the posterior cavity of the trunk is much narrower than the anterior. And the mode of development of the skull teaches us that it is really formed of a number of vertebræ, the bodies of which have fused together to form the base of the skull, while the arches have expanded, and then become fused to form the vault of the skull.

The *Limbs* are four in number, all agreeing in their essential structure. If one were to cut across a limb, say of a sheep (as is done in the leg of mutton you so often see), the following things would be seen. First, the skin would be divided; then a certain amount of fat under the skin; then the red muscles (forming the flesh), each muscle having a definite course; among the muscles, and between these and the bone, blood-vessels and nerves would be visible; while lastly the bone would be arrived at, this forming a supporting framework for the whole.

Such are the main parts of which the body is composed, and such is their relation to one another. We may classify the results so far obtained as follows:—

1. The Head
   - 1. cranium — containing — cerebrum and cerebellum.
   - 2. face cavity — containing — nose, mouth, and pharynx.
2. The Trunk
   - 1. neural canal — containing spinal cord.
   - 2. hæmal canal
     - 1. Thorax — containing heart, lungs, etc.
     - 2. Abdomen — containing alimentary canal, liver, kidneys, etc.
3. The Limbs
   - 1. anterior—arms.
   - 2. posterior—legs.

*(To be continued.)*

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## Julius Cæsar.

*Dramatis Personæ.*—These were first supplied as a list by Rowe in that edition of his in which Shakespeare is presented to us for the first time with illustrations; the date is 1709.

*Julius Cæsar.*—Caius Julius Cæsar, sixteenth in order of time of the score of men Cæsars whose names are recorded in Roman history. He was born exactly a century before the supposed founding of the Christian era, of the prætor whose exact name he bore. Rising through every office that the ambition of a Roman could desire, conqueror over the enemies of his country and his own foes in that country, we find him, when the play begins, at the head of the world of that time. His death befell him on March 15th, B.C. 44.

Every Roman had two names at least—(1) the nomen, denoting his gens, or race; (2) the prenomen (pre=before), corresponding roughly with our first name. He might have—and if he were a patrician he generally had—a third name, (3) cognomen (cum=with); this denoted his familia, or family. He might also bear a fourth name, given in memory of some illustrious exploit; (4) agnomen (ad=to) was the title of this fourth and rarest name.

*Octavius Cæsar.*—His real name was Caius Octavius. The Augustus name was given as an agnomen, and as an expression of the reverence in which the people held him. His grandmother was Julia, sister of Cæsar, the dictator. Born B.C. 63, he was, after the death of his great-uncle, one of the triumvirs, and later the first of the Roman emperors. His life extended fourteen years into the Christian era.

*Marcus Antonius.*—Commonly called Mark Antony. Grandson of the famous orator; son of the somewhat infamous prætor, plunderer of provinces; grandson also of Julia, Cæsar's sister. He was born B.C. 83. The most popular records of his life are to be found in this play and in the one whose half-name is his. He died B.C. 30.

*M Æmilius Lepidus.*—Several men bearing all these three names play their parts in Roman history. The triumvir is the ninth on the list. Clinging during Cæsar's life to the skirts of Cæsar, he governed Rome under his master, and was associated with him in his third consulship. Remembering his sacrifice of his brother to the proscription list (IV. i. 3), one feels a melancholy satisfaction in remembering that he died at Circæa in obscurity, B.C. 13.

*Triumvirs.*—Triumviri, or tresviri (tres=three, vir=man), were in some cases ordinary officers, (such as the triumviri capitales appointed about B.C. 292, who dealt with all capital crimes) or extraordinary commissioners appointed in times of emergency. Of the former class there were in all some ten sets, of the latter, only two at most. These special committees of three are usually said to have consisted of the triumvirate of Cæsar, Pompey, Crassus, in B.C. 60, and of the three men whose names are conjoined in this play. Actually, the first triumvirate, as a recognized trio of magistrates, never existed, and this of Octavius, Antony, Lepidus is, in truth, the only one of the second order.

*Cicero.*—Of the eight Tullii Cicerones in Roman history this is the second in point of time, the first (very easily) in point of fame. Born B.C. 106, his name was on the list of the proscribed that was finished on November 27, B.C. 43. Foremost of Roman orators, he is hardly less famous in this connection than as a writer on philosophy, whilst there was some dabbling on his part with verse.

*Publius.*—This is a common prenomen. It is questionable whether an actual Publius, who was at once a senator and nephew of Antony (IV. i. 5, 6), lived.

*Popilius Lena.*

*Senators.*—The three last names are those of senators. Senes=old men, and the senate was originally an assembly of elders. All the old republics had a popular assembly and a senate. The number of members in this latter body—our House of Lords in name, our House of Commons in power—had reference to the number of tribes in the nation. Three hundred was for long the number in Rome, and Rome had three tribes. Just before our play begins Cæsar had tripled the number. Octavius, as Emperor Augustus, brought the numbers back half-way, to six hundred.

*Marcus Brutus.*—Marcus Junius Brutus. Born B.C. 85, he was fifteen years younger than his Cæsar. A student of books, rather than of men. There is a half-wild theory that Cæsar was his father. At least this much is certain, that he fought against Cæsar, father or no father, in the civil war, siding with Pompey, and that when the war ended in the victory of Cæsar this last made much of Brutus.

*Casca.*—This is Publius Servilius Casca. He and his brother Caius were both concerned in the conspiracy

against Cæsar. Of the life of Publius we have little knowledge: B.C. 44 saw him tribune of the people.

*Trebonius.*—One of the rare men who turned from the side of the patricians after rendering them some service, and cast in his lot with the plebeians. He was tribune of these last, B.C. 55. After Cæsar's death he was pro-consul in Asia, and sent thence to Brutus and Cassius supplies of the 'sinews of war.' He was slain in his bed at Smyrna by Dolabella, profligate and renegade, whom Antony bought over from the republican cause by gold and the Syrian province.

*Ligarius.*—Legate in Africa, B.C. 50. Against Cæsar in the civil war. Tried for this, Cicero's defence saved him.

*Decius Brutus.*—Served under Cæsar in Gaul, and received the command of the fleet at Cæsar's hands. He was greatly loved of Cæsar, who made him his partial heir. Defeating Antony after the killing of Cæsar, he was in turn betrayed to Antony, and by his orders slain, B.C. 43.

*Metellus Cimber.*—A supporter at first of Cæsar.

*Cinna.*—Lucius Cornelius Cinna. Always a revolutionist. He took part in the overthrow of the Constitution of Sulla (B.C. 78), and sided with Sertorius in the servile war in Spain. He owed his after-office as prætor to Cæsar's repeal of the laws of proscription. Yet, though not one of the conspirators, he approved of the conspiracy.

*Flavius and Marullus.*—Tribunes, B.C. 44. Deprived of office and expelled the senate for their opposition to Cæsar.

*Artemidorus of Cnidos, a teacher of rhetoric.*—Teacher of Greek in Rome, and friend of Cæsar. Cnidos is a city in Caria (S.W. of Asia Minor), at the western end of a long peninsula that is the south side of the bay Ceramicus. It is devoted to Aphrodite, and her statue, the Venus of Praxiteles, now at Munich, was at Cnidos. Rhetoric is the study of eloquence (ῥήτωρ=orator), and was used as inclusive of all that led to accurate thinking, writing, or speaking. It included, therefore, all now known as mental philosophy.

*A Soothsayer.*—One of the great group of impostors who, in ancient times, pretended to deal with the supernatural.

*Cinna. A Poet. Another Poet.*—Caius Helvius Cinna. A friend of Cæsar. His chief work, long lost, save for four lines, was on Smyrna.

*Lucilius, Titinius, Messala, Young Cato, Volumnius, friends to Brutus and Cassius.*—Of these Messala only calls for comment other than the course of the play itself will suggest. Born B.C. 70, he lived on until the third year of the Christian era. He was general, consul, governor, historian, poet, orator. Young Cato was the son of Cato of Utica, and brother-in-law of Brutus.

*Varro, Clitus, Claudius, Strato, Lucius, Dardanius, servants to Brutus.*—Strato alone is notable. A Greek rhetorician and friend of Brutus, rather than a servant, as Shakespeare makes him. Lucius is the delightful boy-character of the play.

*Pindarus, servant to Cassius*—He is historical. He was Cassius' freed man.

*Calpurnia, wife to Cæsar.*—Daughter of Lucius Calpurnius Piso Cæsoninus, who was consul B.C. 58. The year before her father's consulship she became the fourth wife of Cæsar. An ordinary wife of an extraordinary husband.

*Portia, wife to Brutus.*—Cato's daughter. Brutus was her second husband, married three years after the death of Bibulus, consul with Cæsar, B.C. 59.

*Senators, Citizens, Guards, Attendants, etc.*

*Scene, Rome, the neighbourhood of Sardis: the neighbourhood of Philippi.*—Sardis, the ancient capital of Lydia, in Asia Minor. It became part of the Roman empire, B.C. 190. Philippi, a city of Macedonia.

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## JULIUS CÆSAR.

### ACT I.

### Scene I. Rome. A Street.

*Enter* FLAVIUS, MARULLUS, and certain Commoners.

*Flav.* Hence! home, you idle creatures, get you home:
Is this a holiday? What! know you not,
Being mechanical, you ought not walk
Upon a labouring day without the sign
Of your profession? Speak, what trade art thou?

*First Com.* Why, sir, a carpenter.

*Mar.* Where is thy leather apron and thy rule?
What dost thou with thy best apparel on?
You, sir, what trade are you?

*Sec. Com.* Truly, sir, in respect of a fine workman, I am but, as you would say, a cobbler.

*Mar.* But what trade art thou? Answer me directly.

*Sec. Com.* A trade, sir, that, I hope, I may use with a safe conscience; which is, indeed, sir, a mender of bad soles.

*Mar.* What trade, thou knave? thou naughty knave, what trade?

*Sec. Com.* Nay, I beseech you, sir, be not out with me: yet, if you be out, sir, I can mend you.

*Mar.* What meanest thou by that? mend me, thou saucy fellow!

*Sec. Com.* Why, sir, cobble you.

*Flav.* Thou art a cobbler, art thou?

*Sec. Com.* Truly, sir, all that I live by is with the awl: I meddle with no tradesman's matters, nor women's matters, but with awl. I am, indeed, sir, a surgeon to old shoes; when they are in great danger, I recover them. As proper men as ever trod upon neat's leather have gone upon my handiwork.

*Flav.* But wherefore art not in thy shop to-day? Why dost thou lead these men about the streets?

*Sec. Com.* Truly, sir, to wear out their shoes, to get myself into more work. But, indeed, sir, we make holiday, to see Cæsar and to rejoice in his triumph.

*Mar.* Wherefore rejoice? What conquest brings he home?
What tributaries follow him to Rome,
To grace in captive bonds his chariot-wheels?
You blocks, you stones, you worse than senseless things!
O you hard hearts, you cruel men of Rome,
Knew you not Pompey? Many a time and oft
Have you climb'd up to walls and battlements,
To towers and windows, yea, to chimney-tops,
Your infants in your arms, and there have sat
The livelong day, with patient expectation,
To see great Pompey pass the streets of Rome:
And when you saw his chariot but appear,
Have you not made an universal shout,
That Tiber trembled underneath her banks,
To hear the replication of your sounds,
Made in her concave shores?
And do you now put on your best attire?
And do you now cull out a holiday?
And do you now strew flowers in his way
That comes in triumph over Pompey's blood?
Be gone!
Run to your houses, fall upon your knees,
Pray to the gods to intermit the plague
That needs must light on this ingratitude.

*Flav.* Go, go, good countrymen, and, for this fault,
Assemble all the poor men of your sort;
Draw them to Tiber banks, and weep your tears
Into the channel, till the lowest stream
Do kiss the most exalted shores of all.
[*Exeunt all the Commoners.*
See, whether their basest metal be not moved;
They vanish tongue-tied in their guiltiness.
Go you down that way towards the Capitol;
This way will I: disrobe the images,
If you do find them deck'd with ceremonies.
*Mar.* May we do so?
You know it is the feast of Lupercal.
*Flav.* It is no matter; let no images
Be hung with Cæsar's trophies. I'll about,
And drive away the vulgar from the streets:
So do you too, where you perceive them thick.
These growing feathers pluck'd from Cæsar's wing
Will make him fly an ordinary pitch,
Who else would soar above the view of men,
And keep us all in servile fearfulness. [*Exeunt.*

*Act I.*—The acts, not the scenes (with the single exception of this first one), are given in the folio.

*The first entry.*—I like the rugged force of the reading of Capell, 'Enter a rabble of citizens, Flavius and Marullus driving them.' The commoners are, of course, the plebeians, though 'the first commoner in England' to-day, the Speaker of the House of Commons, would probably resent being called a plebeian. Herein we see how the meanings of words change with the times.

3. *Mechanical.*—Mechanics, workers.

*Ought not walk.*—Note the omission of the 'to.' This is the only case in Shakespeare where such an omission occurs.

4. *Labouring.*—Here a gerund or verbal noun, equivalent to 'ad laborandum;' a day for working.

*Sign.*—In his usually delightful anachronistic way, Shakespeare reads a custom of his own Elizabethan time into the citizen life of Rome. In his age and country, but not, as far as we know, in those of Brutus, artisans wore habitually a clothing that bewrayed their calling.

8. *Best apparel.*—Donned in that it is the day of Cæsar's triumph (line 32). But the tribunes are jealous of his power, seeing, as Brutus saw, that the excessive power of the one was an excessive danger to the many.

10. *In respect of.*—Compared with. He plays on words, a diversion, let us remember, very rife in Shakespeare's time, or after, for even the staid Bacon puns gently in his Essays. It ran on into a later age, and your Milton puns in his epic poetry, whilst George Herbert puns even in his sacred poems. *Find out all the cases in Julius Cæsar of this habit.*

11. *You.*—Who. Dickens is fond of the construction 'as who should say.' It is superfluous to warn the student against taking Dickens as a master in English.

12. *Directly.*—Straightway. Perhaps a half-play on words here again, as he may mean also 'at once.'

15. *Marullus.*—The speech is sometimes given to Flavius. If, however, any alteration in this way is to be made, it must extend also to the next speech. The two clearly belong to the same man.

*Knave.*—Let us bear in mind that 'knave' is the German 'knabe,' boy. This is an instance of a principle that we may call 'the degradation of words.' Certain words in English, having a certain meaning at first, acquire by degrees an unpleasant or an evil significance. *Find others in this play or from the ordinary vocabulary.*

16. *Out.*—Of temper. 'To fall out' is in use.

17. *Out.*—At heel. To-day we say 'down at heel,' but 'out at elbows.'

22. *Awl.*—An instrument with a handle at one end, a point at the other, used for piercing leather.

24. *With awl.*—Rowe writes this 'withal,' and runs it on into the next words. The reading most in consonance with the atrocious pun would be obtained by the substitution of 'all' for 'awl' in the text.

25. *Recover.*—Another atrocity. The word in the second part of its double meaning, 'to restore,' is only now used in the middle voice, 'I am recovered, or I recover myself.'

*Proper.*—Handsome. A word that has suffered degradation to-day by its users more than in its sense. Only the vulgar employ it now.

26. *Neat.*—Any member, young or old, male or female, of the genus Bos; calf, steer, or heifer, therefore.

27. *Handiwork.*—Hand-ywork; that is, hand-worked. The y is the *ge* of the German past participle. We have that same *ge* retained in the y of yclept.

30. *To wear out their shoes.*—An instance of humour as opposed to wit. The bad puns are cases—extreme cases—of wit; but this is of the flavour of character, and its force would depend more upon the manner of saying it than on the saying.

32. *Triumph.*—The victor general returning to Rome was borne into the eternal city in a chariot drawn by four horses; thus, with the captives and the spoils of war preceding him, he passed along the Sacred Way upwards to the Capitol, in whose temple of Joye the priests stood robed and ready for the sacrifice of thanksgiving.

36. *Senseless.*—Devoid of feeling.

38. *Pompey.*—Born B.C. 106 or 107, he had received three triumphs, such as that now greeting his successful rival. Marius, the pirates, Mithridates, had all yielded to his power. With Cæsar and Crassus he formed what is called inaccurately the first triumvirate. Crassus dying, the two, Pompey and Cæsar, were left face to face, and the struggle that ended with the battle of Pharsalia took place. He, fleeing to Egypt, was slain ere he landed, B.C. 48.

38-48.—A word-picture, very realizable. Note, in line 41, 'Your infants in your arms;' a fine touch, as showing the universality of the holiday, shared, as it is, by the poorer folk and by their children.

42. The first line in the play that is of the dramatic iambic form, with an extra syllable at its end. *Note others.*

44. *His chariot but appear.*—The glimpse of his triumphant chariot sets them ashouting ere his form is seen.

45. *An universal.*—Inaccurate use of 'an.' In the employment of 'an' before this sound of 'u' we have the common blunder of confusing the thing and the symbol for the thing. 'An' ought only to be used before a vowel-*sound*, not a vowel-sign. You might as well write 'an young man.'

46. *Tiber.*—The river of Rome. Rising in the heart of the 'olive-sandall'd Apennines,' it receives forty tributaries, and, after running 235 miles, reaches Rome; thence, for the fifteen miles of its journey seaward, it is navigable. It plunges into the Tyrrhene Sea at Ostia.

*(To be continued.)*

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# Anecdotal Natural History.

BY REV. J. G. WOOD, M.A., F.L.S.,
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AND THEODORE WOOD,
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## No. XXVI.—THE MARSUPIALS.

### PART V.

THE crab-eating opossum is rather smaller than the Virginian species, seldom exceeding thirty or thirty-one inches in total length; of this, nearly one half is occupied by the tail. The colouring is rather remarkable, and varies very much according to the attitude in which the animal happens to be resting. This is owing to the peculiar tinting of the fur, each hair being white at the base, but gradually deepening into black towards the extremity. The limbs, feet, and the basal half of the tail are always black.

The young, however, are coloured very differently from the adult animals, their fur being of an uniform chestnut-brown hue during the first two or three months of their existence.

THE pretty little animal known as Merian's Opossum (*Philander dorsigerus*) is worthy of notice if only for the curious manner in which the young are carried while

yet unable to shift for themselves. In this species the marsupial pouch is wanting, its place being only indicated by a fold in the skin. Thus deprived of their natural refuge, the mother animal is forced to find some other means of carrying her offspring, and this she does by placing them on her back, where they cling tightly to her fur by means of their hand-like paws. In order to attain greater security, however, each of the little animals coils its own tail tightly round that of its mother, which she carries over her back, the whole group thus presenting a most curious and interesting appearance. This remarkable method of carrying the young is common to several other species of opossum, but in none is it adopted so early or continued for so long.

This opossum, which is found in Surinam, is quite a small animal, its total length never exceeding twelve or thirteen inches, of which more than half is occupied by the tail.

grasp. At first sight these paws appear to be furnished with no less than six fingers, one of which is not terminated by a nail or claw. Upon closer examination, however, the superfluous member is seen to be nothing more than a development of one of the smaller bones of the wrist, which supports a fold of the skin.

The colouring of the yapock is very singular, a broad streak of black running along the spine, while four transverse bands of the same sombre hue cross it transversely, the ground colour of the rest of the body being a pale grey. The upper surface of the head is black, as is also the tail for about two-thirds of its length.

Although larger than Merian's opossum, the yapock is yet a small animal, the head and body measuring only ten inches or so in length. The tail is rather variable in dimensions, sometimes attaining to the length of fifteen inches. The animal, which seems very scarce, is a native of Brazil, where it inhabits the banks of the streams and rivers.

Merian's Opossum.

IN the Yapock Opossum (*Cheironectes Yapock*) a curious modification of structure takes place, the animal being intended to lead a semi-aquatic life, and its formation being altered accordingly. Thus the hinder feet are large and broad, and are webbed like those of a duck; the fore-paws are also webbed as far as the first joint of the fingers, while the body is elongated into the cylindrical form which we have learnt to recognise as that best adapted for passing through the water with the least possible resistance.

The animal is also furnished with large cheek-pouches, in which it is supposed to store up the fruits of its sub-aquatic expeditions in search of prey, thus avoiding the necessity of returning to dry land after every individual capture.

The prey in question appears to consist chiefly of fish, water-crustacea, and similar beings, which, aided by the peculiarities of its structure, the yapock is able to pursue and capture with seeming ease. In order to assist it in seizing, and also in retaining its prey when once captured, the fore-paws are endowed with considerable power of grasp, which enables their owner to secure the most slippery fish when once fairly in its

The older naturalists, who did not recognise its marsupial nature, took it for an otter, and called it by the name of the Demerara, or Guianan Otter. Even Buffon was misled on this point.

WE have now described all the principal members of this remarkable family of animals, of which it will have been noticed that a single group only is not peculiar to Australia. Many conjectures have been made as to the reason why that part of the world should have been populated by mammalian inhabitants so remarkable in point of structure, and so low in the scale of creation, but it would seem that this curious fact can only be explained by accepting a theory of the late Mr. Darwin's, to the effect that for the due development of species an extended area of country is an absolute necessity. To quote his own words:—'Although isolation is of great importance in the production of new species, on the whole I am inclined to believe that largeness of area is still more important, especially for the production of species which shall prove capable of enduring for a long period, and of spreading widely.

'Throughout a great and open area, not only will there be a better chance of favourable variations, arising from the large number of individuals there supported, but the conditions of life are much more complex from the large number of already existing species; and if some of these many species become modified and improved, others will have to be improved in a corresponding degree, or they will be exterminated. Moreover, great areas, though now continuous, will often, owing to former oscillations of level, have existed in a broken condition; so that the good effects of isolation will generally, to a certain extent, have concurred.' (Darwin's 'Origin of Species,' chap. iv.)

Thus, in what is practically the single continent formed by Europe, Asia, and Africa, mammals reach their highest development; in America, which, although of great extent, is yet far inferior in size to the vast continent of the Old World, we find animals high in the scale indeed, although by no means to the same extent. But in Australia, which is of comparatively insignificant dimensions, the mammalian inhabitants are few, weak, and far lower in point of organization.

Yet, low as are the marsupials in the scale of nature, they still include animals which seem to form types of families found in other parts of the world. Thus the monkeys are represented, imperfectly it is true, by the phalangists; the carnivora, by the Tasmanian wolf, and so on. May we not therefore suppose that, had Australia been exposed to the same conditions as other parts of the world, its mammalian inhabitants would have advanced in a like degree, and that it also would have produced representatives of other and higher families? For it would seem that the germs of development are not wanting, but only the opportunities for enabling those germs to bear fruit.

*(To be continued.)*

—o—

# Lessons in Latin.

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## KEY TO EXERCISES.

### EXERCISE I.

1. Gallina *pecked* vulpem. 2. Rex *finished* opus. 3. Cicero *defended* Milonem. 4. Hædus *inhabits* urbem. 5. Arbor *stands*. 6. Vulpes *runs*. 7. *He loses* vitam. 8. Homo *raises* manum. 9. Rex *reigns*. 10. Orator *slew* Ciceronem. 11. Pecunia *ruined* urbem. 12. Pars *ran away*. 13. Opus *will benefit* oppidum. 14. Vinum *ruined* Provinciam. 15. Homo *was plucking* gallinam. 16. Vox *frightened* regem. 17. Mel *pleased* hominem. (N.B.—This sentence is a mistake, as 'pleased' is not followed by the acc. case.) 18. Dominus *killed* gallinam. 19. Domus *fell down*. 20. *He defied* regem.

### EXERCISE II.

A.

1. The slave will water the garden. 2. The slave-master was loving his son. 3. The slave praises his master. 4. The Christian sings a song. 5. The work will fatigue the general. 6. The girl dances. 7. The girl was accusing the slave. 8. The slave will adorn the garden. 9. The master will plough the garden. 10. The fox will fly.

B.

1. Rex evolabat. 2. Vulpes lupum salutabit. 3. Dominus Christianum accusat. 4. Servus arborem ornabat. 5. Pecunia urbem armabit. 6. Puella carmen cantat. 7. Dux militem laudabit. 8. Miles filium amat. 9. Miles hortum irrigabat. 10. Arbor montem ornabit.

### EXERCISE III.

A.

1. The slave-master teaches the girl. 2. O master, the slave was ploughing. 3. O farmer, you will see (your) daughter. 4. O death, you will not frighten the poet. 5. The slave fears death. 6. O slave, you were walking through the city. 7. O son, you were seeing the girl without the knowledge of (her) master. 8. The slave was sinning. 9. The daughter will sin without the knowledge of the farmer. 10. O son, you will not walk through the garden.

B.

1. Patruus nepotem videt. 2. Sororem, fili, terrebis. 3. Poeta filiam docet. 4. Puella gallinam lugebit. 5. Leo lupum clam vulpem videt. 6. Vulpes lupum timet. 7. Puella coronam videbat. 8. Domine, servus per hortum ambulat. 9. Agricola, filium docebis. 10. Poeta filium et filiam terret.

### EXERCISE IV.

A.

1. The girl will hear a voice. 2. You will pluck a grape. 3. O king, you are running into the garden. 4. The lion will frighten the fox. 5. You were binding (his) head. 6. The son was walking through the city. 7. (My) son, you are neglecting your sister. 8. Will not the slave plough? 9. The king will reign. 10. O queen, you will kill (your) son and (your) daughter without the knowledge of the king.

B.

1. Puella, per hortum currebas. 2. Rex reginam occidebat et filium et filiam. 3. Agricola, arvum aras. 4. Rex vulpem terrebat. 5. Nonné per urbem curres? 6. Epistolam scribebat. 7. Nonne filium negligit? 8. Servus caput lædet. 9. Rex, uvam carpes et jacies in hortum. 10. Regina regnat, servus terram arat.

### EXERCISE V.

A.

1. The mother was running into the garden. 2. Was not the father of the slave hurting his daughter? 3. The daughter of the master will walk through the field. 4. The law of truth will neglect death. 5. Will not the farmer plough the field? 6. The uncle will come. 7. He will throw the wolf into the river. 8. The Christian will not value money. 9. Wine delights the heart of man. 10. The master will teach (his) friend's boy and girl.

B.

1. Dominus puellam intelligit. 2. Nonne agricola in agrum currit? 3. Mater in montem filiam mittet. 4. Patris servus agricolæ agrum arabat. 5. Nonne reginæ mater uvam carpebat? 6. Fratris filius agricolæ filiám occidet. 7. Nonne, fili, domini fratrem amabis? 8. Nonne nepos epistolam scribebat? 9. Christianus mortem non timebit. 10. Nonne mater, per hortum ambulabas clam filium?

### EXERCISE VI.

A.

1. The boy was coming that he might write a letter. 2. Are you not running through the city that you may pluck a grape? 3. The father will teach his son that he may be wise. 4. Wisdom teaches the truth. 5. He does not eat that he may live, but lives that he may eat. 6. The soldier will come that he may plough the field. 7. Does not wine delight the boy and the girl? 8. He writes a letter that his mother may hear the truth. 9. He was reading a book that he might learn wisdom. 10. Do you not, O mother, love your son?

B.

1. Non edit ut vivat, sed vivit ut edat. 2. Nonne dominus servum punit ut sapiat? 3. Mater filium laudat, sed pater filiam non laudabit. 4. Nonne curres in hortum ut florem carpas? 5. Servus veniat, ut portam claudat. 6. Finis opus, fili. 7. Sapientia verum laudat. 8. Horatii filius terram arat clam fratrem et sororem. 9. Nonne legem negliges? 10. Horatius poema scribebat ut pecuniam reciperet.

### EXERCISE VII.

*Erratum.*—In vocabulary 7 the genitive of filia (filiæ) is omitted, and the derivative 'filial' is put in its place.

A.

1. We are coming that we may pluck a grape. 2. Will you not write a letter that your mother may hear? 3. Let us read a book that we may learn. 4. We understand (our) son and (our) daughter. 5. We teach the boy. 6. Let us plough the field that it may produce a harvest. 7. My son, you love (your) father and (your) mother, but you do not love (your) brother. 8. Does he not plough the field that he may teach his slave? 2. The master is teaching (his) pupil (disciple) that he may be wise. 10. Let him shut the gate of the town.

B.

1. Agrum aret, ut messem ferat. 2. Venimus ut urbis portam claudamus. 3. Nonne agricola agrum arat, ut servum doceat. 4. Amat matrem quia filiam amat. 5. Nonne vinum poetam delectat? 6. Nonne vocem intelligimus? 7. Per urbem ambulabat. 8. Nonne puerum in aquam jaciemus. 9. Sapientia hominem docebit. 10. Carpamus uvam ut vinum habeamus.

### EXERCISE VIII.

A.

1. The master is teaching the boys. 2. The man loves his sons and his daughters. 3. He comes that he may adorn the girls. 4. O boy, you are not learning. 5. Will not the wolf kill the sheep (pl.)? 6. Let him come that he may shut the gate of the city. 7. He will not hurt (his) sister, because he loves (his) father. 8. Money delights the citizens. 9. Wine destroys men. 10. Will not the poet write a poem?

B.

1. Ambulemus per hortos clam patres. 2. Puer canem in flumen jaciet, quia sorores lædebat. 3. Rogabimus matres, ut per hortos curramus. 4. Manus in aquam mergebat. 5. Curret sub mensas quia canes timet, sed frater per portam ambulabit. 6. Puer literas intelligit et scribet. 7. Lanæ partem carpebat. 8. Agros irrigabit. 9. Laudas, puer, reges et reginas. 10. Edamus ut vivamus.

## EXAMINATION QUESTIONS.

### No. I.

The subject of a sentence is that about which the sentence talks, and is found by asking the question who? or what? to the verb. The object of an active verb is that upon which the verb acts, and is found by asking the question whom? or what? to the verb and subject. The principal use of the acc. case is to express the object of an active verb. The word case means 'falling away,' that is, the falling away from the original form, and declension implies the different 'fallings away.' The genitive probably originally ended in 'ius,' which is found still used in pronouns and the commonest adjectives, and traces of it may be found in all genitives of the singular number. Prepositions are words used to show the connection which one word in a sentence has with another. They are followed by a particular case or cases; but when the same preposition governs more than one case there is always a distinct meaning for either case. A verb is in the indicative mood when it affirms or interrogates, and in the subjunctive when in a dependent or subordinate sentence. (Note.—The Latins used the subjunctive far oftener than we English do.) The acc. singular and plural of masculine and feminine nouns ends in 'm' and 's' respectively; but the acc. singular of neuter nouns is the same as the nominative, and their acc. plural ends in 'a.' (Note.—The reason of the acc. singular being like the nominative is supposed to be by some that a neuter noun, having no life, cannot properly be a subject, and that the nom. when used, is really taken from the accusative.) All interrogative sentences including a 'not' begin with the adverb 'nonne.' In 'compararemus' the 'mus' means 'we,' the 're' 'might,' the 'a' is the distinguishing vowel, and the 'compar' means 'raise.' So 'compararemus' means 'we might raise' (used of troops—equal to 'levy').

## LESSON IX.

### THIRD PERSON PLURAL.

70. The Latin for 'they' at end of active verbs is 'nt.'

71. Unless the 3rd pers. sing. ends in 'it,' the 3rd pers. plural is formed from the 3rd pers. sing. by inserting the 'n' before 't'; as, 'arat,' 'he ploughs;' 'arant,' 'they plough.'

72. VOCABULARY 9.

| *English.* | *Latin.* | | *Derivatives.* |
|---|---|---|---|
| Cat | Felis | G. Felis | Feline |
| Peace | Pax | G. Pacis | Pacific |
| To seek | Petĕre | R. Pet | Petition |
| Ship | Navis | G. Navis | Navy |
| Rock | Scopulus | G. Scopuli | |
| To lead | Ducĕre | R. Duc | Ductile |
| Sailor | Nauta | G. Nautæ | Nautical |
| Near | Juxta, prep. gov. acc. case | | |
| Husband | Maritus | G. Mariti | Marital |
| Wall | Murus | G. Muri | Mural |

| | | | |
|---|---|---|---|
| Wife | Uxor | G. Uxoris | Uxorious |
| Kid | Hædus | G. Hædi | |
| Garrison | Præsidium | G. Præsidii, n. g. | |
| To place | Ponĕre | R. Pon | Position |
| Slave-master | Dominus | G. Domini | Domineer |
| Song | Carmen | G. Carminis, n. g. | |
| Bull | Taurus | G. Tauri | |
| Shepherd | Pastor | G. Pastoris | Pastoral |
| To shear | Tondĕre | R. Tond | Tonsure |

### EXERCISE 9.

#### A.

73. 1. Agros (5) arant (2). 2. Domini filios (7) docet (3). 3. Nonne (4) carmen cantabant (2). 4. Agricolæ (7) tauros timent (3). 5. Pastor oves (8) tondebit. 6. Pastoris felem et (3) canem (8) occident (4). 7. Pacem petent. 8. Nauta navem per (3) scopulos ducit. 9. Horatius (6) juxta murum præsidium ponit. 10. Nonne (4) domini filius (7), puer (7), sororem (8) clam (3) matrem (5) lædit (4)?

#### B.

1. Do they not (4) shear the sheep (8) (pl.)? 2. The husbands were running (4) through (3) the gate (6) near the wall. 3. Will they not (4) hurt (4) the cats? 4. The mother (5) was teaching (3) (her) son (7) and (her) daughter (7) without-the-knowledge-of (3) (her) husband. 5. They are frightening (3) the dogs (8) of the shepherd. 6. He will hurt (4) the kids of the farmer (7), and (3) will not shear the sheep (8) (pl.). 7. The king (8) and the queen (8) and (3) (their) son (7) and (3) daughter (7) are walking (3) into (4) the garden (8). 8. They were placing a garrison near the mountain (5). 9. He will throw (4) the cat into (4) the river (5). 10. Will they not (4) learn (6) (their) letters (8)?

## LESSON X.

### NOMINATIVE AND VOCATIVE PLURAL.

74. The nominative and vocative plural are always alike.

75. The nom. and voc. plural of masc. and fem. nouns have generally the same form as the gen. sing. but—

76. The nom. and voc. plural of I and E nouns generally end in 'es.'

77. The nom. and voc. plural of all neuter nouns end in 'a.'

78. Now you have learnt seven out of the twelve cases, which you ought to write out every day before beginning your exercises, thus:—

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| a | o | i | u | e |

*Singular.*

| N. and V. | | *Word in Vocabulary.* | | | | Subject |
|---|---|---|---|---|---|---|
| Acc | am | um | em | um | em | Object |
| G. | æ | i | is | us | ei | Eng. 'of' |

*Plural.*

| | | | | | | |
|---|---|---|---|---|---|---|
| N and V. | æ | i | es | us | es | Subject |
| Acc. | as | os | es | us | es | Object |

79. Note 11. Since the gen. sing. and nom. plural are so generally alike, the verb should always be looked at first to see if it be singular or plural.

80. VOCABULARY 10.

| *English.* | *Latin.* | | *Derivative.* |
|---|---|---|---|
| Wool | Lana | G. Lanæ | |
| Africa | Africa | G. Africæ | |
| To preserve | Conservare | R. Conserv | Conservative |
| Cæsar | Cæsar | G. Cæsaris | Czar |
| To beg-earnestly | Obsecrare | R. Obsecr | Obsecration |
| Country | Patria | G. Patriæ | Patriotic |
| Roman | Romanus | G. Romani | |
| To conquer | Vincĕre | R. Vinc | Invincible |
| To enrol | Conscribĕre | R. Conscrib | Conscription |
| To drive | Pellĕre | R. Pell | Expulsion |
| To burn | Incendĕre | R. Incend | Incendiary |
| Gaul | Gallus | G. Galli | |
| Therefore | Itaque, conj. | | |
| Embassy | Legatio | G. Legationis | Legation |
| To | Ad, prep. gov. acc. case. | | |
| Corn | Frumentum | G. Frumenti, n. g. | Frumenty |
| To keep | Servare | R. Serv | Servant |
| To sell | Vendĕre | R. Vend | Vendor |
| Faith | Fides | G. Fidei | Fidelity |
| To fight | Pugnare | R. Pugn | Pugnacious |
| Mouse | Mus | G. Muris | |
| Enemy | Hostis | G. Hostis | Hostile |
| Sun | Sol | G. Solis | Solar |
| Lieutenant | Legatus | G. Legati | Legate |
| To shine | Fulgĕre | R. Fulg | Refulgent |
| To warm | Tepidare | R. Tepid | Tepid |

81. EXERCISE 10.

#### A.

1. Matres (5) filios (7) amant (2) sed (6) patres (5) filias (7) amant. 2. Magistri (5) discipulos (7) docent (3) ut (6) sapiant (6). 3. Nonne (4) pastores (9) oves (8) tondebant (9) ut (6) lanam venderent. 4. Pueri (7), domini (9) servos (7) laudant (2). 5. Nonne (4) feles (9) mures edunt (6)? 6. Sol fulget, et (3) terram (8) tepidat. 7. Fidem servent ut (6) urbem (7) conservent. 8. Servi (7) dominos (9) obsecrant ut (6) hostes pugnent. 9. Romani Gallos vincunt et (3) in (4) montes (5) pellunt. 10. Legationes ad Africam veniunt (5) ut (6) pacem (9) petant (9).

#### B.

1. The enemy (pl.) will send (5) an embassy. 2. The lieutenants were enrolling soldiers (6) that (6) they might fight. 3. Will not (4) the soldiers (6) come (5) to Africa that (6) they may burn the towns (7)? 4. The sun warms the earth (8) that (6) it may produce (7) a harvest (7). 5. O father (5), the boys (7) are not (3) keeping (their) faith. 6. The Roman was killing (4) the sons (7) of the Gaul. 7. The cat (9) is killing (4) the mice, therefore she will not (3) eat (6) corn. 8. Will not (4) men (5) eat (6) that (6) they may preserve their lives (1)? 9. Horace (6) and (3) Cæsar were walking (3) through (5) the city (7). 10. The girls (8) were throwing (4) the corn into (4) the water (7).

## LESSON XI.

### THE SECOND PERSON PLURAL.

82. The Latin for 'you' (plural) at end of active verbs is 'tis;' as, 'monet,' he advises; 'monetis,' ye advise.

83. Now we must learn to parse. Let us begin with the nominative and accusative cases of nouns. In the sentence, 'Gallina ovum ponit' ('The hen lays an egg'), we should parse the nouns thus:—Gallina is a noun of the A declension, because its genitive ends in

æ; fem. gender, sing. number, and nom. case, because it is the subject of the sentence. Ovum is a noun of O declension, because its genitive ends in i; neut. gen., sing. numb., acc. case, because it is the object of the verb 'ponit.'

These may be shortly written thus:—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gallina | N. | A | æ | F. | S. | N. | Sub. of sentence. |
| ovum | N. | O | i | N. | S. | Ac. | Obj. of ponit. |

And in this way I recommend you to parse all your nouns for some time.

84. VOCABULARY 11.

| *English.* | *Latin.* | | *Derivative.* |
|---|---|---|---|
| Head | Caput | G. Capitis, n. g. | Capital |
| Egg | Ovum | G. Ovi, n. g. | Oviary |
| To lay (put) | Ponĕre | R. Pon | Position |
| Meadow | Pratum | G. Prati, n. g. | |
| To watch | Vigilare | R. Vigil | Vigilance |
| Children | Liberi (no sing., O noun) | | |
| Parent | Parens | G. Parentis | Parental |
| Wood | Sylva | G. Sylvæ | Sylvan |
| Shell | Concha | G. Conchæ | Conchology |
| Collect | Colligĕre | R. Collig | Collection |
| To tear to pieces | Dilaniare | R. Dilani | |
| To call | Vocare | R. Voc | Vocative |
| Life | Vita | G. Vitæ | Vital |
| Sea | Mare | G. Maris, n. g. | Marine |
| Road or Way | Via | G. Viæ | Devious |
| To betray | Prodĕre | R. Prod | |
| Hare | Lepus | G. Leporis | Leporine |
| Hen | Gallina | G. Gallinæ | Gallinaceous |
| To surround (bind) | Cingĕre | R. Cing | Cincture |
| To break (word) | Fallĕre | R. Fall | Fallacious |

EXERCISE 11.

A.

85. 1. Fili (7) et (3) filia, (7) fidem (10) fallitis. 2. Hædos (9) occidebatis (4) et edebatis (6) ut (6) vitas conservaretis (10). 3. Matres, (5) filias (7) amatis (2). 4. Felis (9) mures (9) occidebat (4) et canis (8) leporem dilaniabat. 5. Horatius (6) pone (8) Cæsarem (10) ambulat (2). 6. Nonne (4) curretis (4) in (4) mare et conchas colligetis. 7. Mater (5) et (3) pater (5), pueri (7) et puellæ (8), liberos vocant. 8. Epistolam (7) scribet (4) ut (6) legatis (6). 9. Magister (5) pueri (7) caput cingit. 10. Nonne (4) pueri, (7) parentes amabitis (2)?

B.

1. O Romans (10), were you not (4) burning (10) the city (7) that (6) you might preserve (10) (your) country (10)? 2. O hens, you were not laying eggs. 3. Will you not (4), O Romans (10), keep (10) your faith (10)? 4. They were running (4) into (4) the meadow through (3) the road near (9) the wood. 5. You will shear (9) the sheep (8) (pl.). 6. You (pl.) are coming (5) to (10) Africa (10) that (6) you may enrol (10) soldiers (6). 7. Are you not (4), O Gauls (10), killing (4) the kids (9) of the farmers (7) that you may eat (6) (them)? 8. We will run (4) through (3) the city (7). 9. He sends (5) a garrison (9) into the field (7) that it may watch the mountain (5). 10. O Horace (6) and Cæsar (10), you are betraying (your) country (10).

## LESSON XII.

### THE DATIVE SINGULAR.

86. The termination of the dative (or joining) case singular is really 'i,' but in the A declension, as the 'i' follows an 'a,' the 'ai' is written 'æ,' and in the O and I declension it is dropped altogether.

87. The dative singular endings are therefore thus:—

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| a | o | i | u | e |
| ai (æ) | oi (o) | ii (i) | ui | ei |

where the forms used are inserted in brackets.

88. The dative is used to express the person or thing to or for which anything is or is done, called the indirect object of the verb; as, 'He gives a book to Cæsar' ('Dat Cæsari librum'), which may also, of course, be translated, 'He gives Cæsar a book.'

89. The parsing of Cæsari would be as follows:—Cæsari is a noun of the I decl., because its gen. ends in 'is'; mas. gen., sing. numb., and dative case, because it is the indirect object of the verb 'dat,' shortened thus:—

| | | | | | | |
|---|---|---|---|---|---|---|
| Cæsari | N. | I | is | M. | S. | D. | Indir. obj. of 'dat.' |

90. Now, when you write out the scheme of nouns (as in par. 78), insert the dat. case after the gen. sing. This will give you eight out of the twelve cases you have to learn.

91. VOCABULARY 12.

| *English.* | *Latin.* | | *Derivative* |
|---|---|---|---|
| To work | Laborare | R. Labor | Elaborate |
| Alps | Alpes (no sing. form, I decl.) | | |
| Fountain | Fons | G. Fontis | Font |
| Food | Cibus | G. Cibi | |
| To cover (with food) | Instruĕre | R. Instru | Instruct |
| On-this-side-of | Cis, prep. gov. acc. case | | Cisalpine |
| To provide | Parare | R. Par | Preparation |
| To cook | Coquĕre | R. Coqu | Concoction |
| To make free | Liberare | R. Liber | Liberation |
| Milk | Lac | Lactis, n. g. | Lactic |
| To give | Dare | R. D | Dative |
| To pour out | Fundĕre | R. Fund | Fusion |
| Flesh | Caro | G. Carnis | Carnal |
| Barn | Granarium | G. Granarii | Granary |
| Lessons | Dictata (no sing., O decl.) | | Dictation |
| To play | Ludĕre | R. Lud | Elude |
| To bring | Ferre (see V. 7) | R. Fer | Fertile |
| To condemn | Damnare | R. Damn | Damnation |
| Apple | Pomum | Pomi | Pomade |
| Across | Trans, prep. gov. acc. case | | |
| To reap | Metĕre | R. Met | |
| To fill | Implĕre | R. Impl | Completion |
| Mistress | Domina | G. Dominæ | Domineer |

EXERCISE 12.

Note in sentence 1 that, though 'puellæ' might be either gen. or dat., its position shows that it is more likely to be the dat. than the limiting genitive, the place of which would be before 'lanam.'

1. Lanam (10) puellæ (8) carpebas (5). 2. Nonne (4) fili (7), matri (5) ad (10) fontem curres (4)? 3. Hædos (9) domino (9) occidet (4) et (3) dominæ cibum coquet. 4. Cæsarem (10) damnant ut (6) patriam (10) conservent (10). 5. Patri (5) et (3) matri (5) libros (6) dabant. 6. Nonne (4) discipuli (7) magistro (5) literas (8) discebant (6). 7. Nonne (4) per (3) arva (7) ambulatis (3) ut sororibus (8) flores (6) carpatis (5)? 8. Puella (8) feli (9) lac fundebat, et puer (7) cani (8) carnem ferebat. 9. Nonne dictata disces (6) ut sapias (6). 10. Servi (7) arva (7) domino (9) arant (2).

B.

When the Latin and English idioms differ the English (not to be translated) will be inserted in brackets.

1. They were giving books (6) to (their) son (7) and (3) daughter (7) that (6) they might read (6)

them. 2. You (pl.) will condemn Cæsar (10) of (his) head (11) (Eng., to death) that (6) you may preserve (10) (your) country (10). 3. Will you not (4) give (your) father (5) an apple? 4. Were you not (4) running (4) across the field (7) that (6) you might pluck (4) flowers (6) for your mother (5)? 5. Let the slave (7) reap the harvest (7) for the farmer (7), that (6) he may fill (his) barns. 6. Will not (4) the boys (7) play near (9) the river (5)? 7. Let husbands (9) provide tables (8) for (their) wives, but (6) let wives (9) cover the tables for (their) husbands (9). 8. The sun (10) shines (10) for the king (8) and (3) (his) slave (7). 9. The mother (5) works for (her) daughter (7), and the daughter sings (2) for (her) brother (5). 10. Will you not (4), O Romans (10), conquer (10) the Gauls (10) on-this-side-of the Alps, that you may make free your city (7)? (Eng., make your city free).

## LESSON XIII.

### THE THIRD PERSON PLURAL, WHEN THIRD SINGULAR ENDS IN 'IT.'

93. The third pers. plur. of those tenses whose third singular ends in 'it' (as far as we have learnt such tenses) ends in 'unt,' and not 'int;' but the 'unt' has an 'i' before it in the present of I verbs, and also the present of short E verbs whose roots end in 'i;' thus, 'occidit' (he kills) becomes 'occidunt' (they kill) in the plural, 'arabit' (he will plough) becomes 'arabunt' (they etc.); but 'audit' (he hears) becomes 'audiunt' (they hear), and 'rapit,' R. rapi (he seizes) becomes 'rapiunt' (they seize).

94. The parsing of the limiting genitive case is as follows, taking the example 'Cæsaris mater flet' (Cæsar's mother weeps) :—

Cæsaris | N. | I | is | M. | S. | G. | Limiting 'mater.'

95. VOCABULARY 13.

| *English.* | *Latin.* | | *Derivative.* |
|---|---|---|---|
| Work | Opus | R. Oper, n. g. | Operation |
| To seize | Rapĕre | R. Rapi | Rapture |
| Ox | Bos | G. Bovis | Bovine |
| To fly | Fugĕre | R. Fugi | Fugitive |
| Fire | Ignis | G. Ignis | Ignite |
| To lie (down) | Jacĕre | R. Jac | Adjacent |
| Not-to-know | Nescire | R. Nesc | |
| Thing | Res | G. Rei (E decl.) | |
| To cackle or cluck | Glocire | R. Gloc | |
| To show | Demonstrare | R. Demonstr | Demonstration |
| Roar / Noise | Clamor | G. Clamoris | |
| Lion | Leo | G. Leonis | |
| When | Quum, a conjunction and interrogative adverb | | |
| Widow | Vidua | G. Viduæ | |
| To (make) cool | Refrigerare | R. Refriger | Refrigerator |
| Therefore | Ergo, a conjunction | | |
| Cow | Vacca | G. Vaccæ | Vaccination |
| Horse | Equus | G. Equi | Equipage. |
| To approve | Approbare | R. Approb. | Approbation. |

### EXERCISE 13.

#### A.

96. 1. Nonne (4) pueri (7) dabunt (12) libros (6) magistro (5)? 2. Pueri (7) mater (5) filiæ (7) opus parabit (12). 3. Vulpes (8) uvas (7) rapiunt. 4. Nonne (4) magistri (5) discipulos (7) puniunt (6) ut (6) dictata (12) discant (6)? 5. Hædi (9) leonem (3) audiunt (4) et (3) timent (3). 6. Boves arva (7) arabunt (2) ut (6) messem (7) ferant (7). 7. Nonne (4) oves (8) lupum (8) vident (3) et (3) fugiunt? 8. Canis (8) et (3) felis (9) juxta (9) ignem jacent. 9. Pueri (7) magistrum (5) timent (3) quia (7) dictata (12) nesciunt. 10. Rem intelligimus (5) et (3) approbamus.

#### B.

1. The boys (7) seize the eggs (11), and (3) the hens (11) cackle. 2. Do not (4) the kids (9) fear (3) when they hear (4) the roar of the lion? 3. The boys (7) learn (6) (their) lessons (12) when they hear (4) the schoolmaster. 4. Do not (4) the girls (8) pluck (4) the grapes (7) for (their) mother (5) that (6) she may give (12) them to the widow? 5. They dip (8) (their) hands (8) into (4) the river (5) that (6) they may cool them. 6. When are you (sing.) coming (5) to (10) the town (7) that (6) you may learn (6) a song (9)? 7. Will you not (4) kill (4) the hare (11) for (your) son's (7) dog (8)? 8. The girls (8) do not-know (their) lessons (12), therefore they will not (3) play (12). 9. Boys (7) show to (their) sisters (8) (their) books (6). 10. The girls (8) are running (4) through (3) the meadow (11) that (6) they may see (3) the horses and (3) cows.

## LESSON XIV.

### GENITIVE PLURAL.

97. The genitive plural always ends in 'um,' preceded by the characteristic; and in the A, O, and E declensions 'r' is inserted between the characteristic and the ending 'um;' thus :—

| | 1 a | 2 o | 3 i | 4 u | 5 e |
|---|---|---|---|---|---|
| Gen. plur. | arum | orum | ium | uum | erum |

which insert in your scheme of nouns.

98. In the I decl. those nouns whose roots have as many or more syllables than the nom. generally drop the 'i' before the 'um;' so that the gen. plur. may have only one more syllable than the nom. sing.

99. These nouns are called consonantal nouns.

100. The original forms of nouns are found by throwing away the 'um' or 'ium' from the genitive plural, and the last letter of this original or crude form is their characteristic.

101. If, therefore, a noun of the 3rd decl. makes its genitive plural in 'um' instead of 'ium,' contrary to the law laid down in paragraph 98, the syllable 'con.' (consonantal) will be inserted after it in the vocabulary; *e.g.*, 'Dog, Canis (con.),' etc. The genitive plural of 'canis' is, therefore, 'canum,' of only two syllables, and not 'canium,' of one more syllable than the nominative. So also from 'mater,' 'pater,' and others, we find 'matrum,' 'patrum,' etc.

102. There are also some nouns and adjectives whose genitive plurals end in two more syllables than the nom. by retaining the 'i' before the 'um,' as 'mons.,' G. 'montis,' G. pl. 'montium,' when we should have expected 'montum.' Such nouns will be marked in the vocabularies by 'exc. I,' (exceptionally an I noun); thus, 'Mons. (exc. I).'

103. VOCABULARY 14.

For explanation of 'con.' after word, see paragraph 101.

| *English.* | *Latin.* | | *Derivative.* |
|---|---|---|---|
| Dog | Canis (con.) | G. Canis | Canine |
| Bird | Avis | G. Avis | Aviary |

| | | | |
|---|---|---|---|
| Courtyard | Area | G. Areæ | |
| Number | Multitudo | G. Multitudinis | |
| To know | Scire | R. Sci | Science |
| Ploughman | Arator | G. Aratoris | |
| Father | Pater (con.) | G. Patris | Paternal |
| Wing / Feather | Penna | G. Pennæ | Pen |
| Neighbour | Finitimus | G. Finitimi | |
| Puppy | Catulus | G. Catuli | |
| State | Civitas | G. Civitatis | |
| Mother | Mater (con.) | G. Matris | Matricide |
| Shadow | Umbra | G. Umbræ | Umbrageous |
| Peacock | Pavo | G. Pavonis | |
| Garment / Dress | Vestitus | G. Vestitus | Vestment |
| To say (lesson) | Recitare | R. Recit | Recitation |
| To descend | Descendĕre | R. Descend | Descent |
| Brother | Frater (con.) | G. Fratris | Fraternity |
| Colour | Color | G. Coloris | |
| Invite | Invitare | R. Invit | Invitation |
| Romulus | Romulus | G. Romuli | |
| Seed | Semen | G. Seminis n. g. | |
| Spectacle | Spectaculum | G. Spectaculi | Spectacular |
| To drink | Bibĕre | R. Bib | Bibulous |
| Virgin | Virgo | G. Virginis | Virginal |
| Nest | Nidus | G. Nidi | |
| Before-that | Antequam, a conjunction | | |
| To scatter / or sow | Spargĕre | R. Sparg | Sparse |

### EXERCISE 14.

#### A.

104. 1. Agricolarum (7) homines (5) agros (5) arant (2) antequam semina spargunt. 2. Multitudinem finitimorum in (4) civitatem recipit (6). 3. Feles (9) canum catulos occidebant (4). 4. Filii patrum libros (6) legent (6) et (3) sororibus (8) recitabunt. 5. Puellæ (8) matrum vestitus habent (7). 6. Gallinæ (11) ova (11) ponunt (11) et glociunt (12). 7. Romulus ad (10) spectaculum finitimorum multitudinem invitat ut (6) homines (5) virgines rapiant (13). 8. Catuli matrum clamorem (13) sciunt et (3) veniunt (5). 9. Pavo ad (10) aquam (7) descendet et (3) bibet. 10. Pennarum colores videmus (3).

#### B.

1. The puppies of the dogs will run (14) across (12) the meadow (11). 2. The cows (13) frighten (3) the children (11) of the ploughman, and of the farmer (7). 3. The man (5) sells (10) the wool (10) of the sheep (pl.) (8), and (3) gives (12) the money (5) to (his) father. 4. The horses (13) of the boys (7) run (4) through (3) the river (5). 5. The waters (7) of the rivers (5) water (2) the meadows (11). 6. The shadows of the trees (1) make the fields (7) cool (13). 7. He drives (10) the horses (13) of the girls (8) into (4) the courtyard. 8. The boys (7) seize (13) (Eng., take) the nests of the birds and (3) give (2) (them) to (their) sisters (8). 9. Will you not (4), O Horace (6), give (12) (your) mother (your) grapes (7)? 10. They will come (5) that (6) they may seize (13) (your) city (7) and (3) burn (10) (your) houses (1).

## LESSON XV.

### THE FIRST PERSON SINGULAR.

105. The Latin for 'I' at the end of an active verb is generally 'm,' but sometimes 'o,' and in one tense, which we have not yet referred to, it is 'i.'

106. The termination 'o' is found in all present tenses of the indicative mood, in the future of A and long E verbs (*i.e.*, those verbs which retain the 'bi,' meaning 'will'), and in one other tense, which we have not yet learnt. Long E and I verbs keep the E and I before 'o,' but A and short E verbs drop the characteristic, as from

| | | | |
|---|---|---|---|
| amat | monet | regit | audit |

we get

| | | | |
|---|---|---|---|
| amo | moneo | rego | audio |

107. The termination 'm' is found in all other tenses we know, but the 'e' of the future tense of short E and I verbs is changed into 'a;' thus, from 'rapiet,' 'he will seize,' we have 'rapiam,' 'I will seize.'

108. The terminations, therefore, of the tenses we know are as follows :—

| Sing. | | | Thou | He, etc. | Plu. | We | Ye | They |
|---|---|---|---|---|---|---|---|---|
| | m | r o | s | t | | mus | tis | nt |

109. 'I' and 'we' are called 1st persons (speaking *of* oneself); 'thou' and 'ye' are called second persons (speaking *to* one or more); 'he,' etc., and 'they' are called third persons (speaking *of* one or more).

110. To parse a verb: take as example, 'Gallina ovum ponit:'—

'Ponit' is a verb of the short E conjugation, indicative mood, present tense, third person, singular number, to agree with 'Gallina;' shortened, as in the case of nouns—

Ponit | V. | ĕ | Ind. | Pr. | 3rd | S. | Agree with Gallina.

### 111. VOCABULARY 15.

| *English.* | *Latin.* | | *Derivative.* |
|---|---|---|---|
| Body | Corpus | G. Corporis, n. g. | Corporation |
| To bury | Sepelire | R. Sepel | Sepulture |
| Evil | Malum | G. Mali, n. g. | |
| To do / To make | Facĕre | R. Fac | Factory |
| Good (thing) | Bonum | G. Boni, n. g. | Bonus |
| To buy | Emĕre | R. Em | Redemption |
| Grave / Tomb | Sepulchrum | G. Sepulchri, n. g. | |
| To become / To come (to pass) | Fieri | R. F (I conj.) | |
| Bread | Panis | G. Panis | |
| To worry | Vexare | R. Vex | Vexatious |
| Dinner | Prandium | G. Prandii, n. g. | |
| To-morrow | Cras, an adv. | | |
| If | Si, a conjunc. | | |
| To rouse | Excitare | R. Excit | Excitement |
| To say / To tell | Dicĕre | R. Dic | Diction |
| To be strong | Valĕre | R. Val | Valiant |

### 112. EXERCISE 15.

#### A.

1. In (4) aquam (7) manus (8) mergo (8). 2. Carmen (9) cantabam (2) ut (6) filium (7) docerem (3). 3. Rapiam (13) corpus (14) et (3) in (4) mare (11) jaciam (4). 4. Per (3) urbem (7) ambulabam (3) ut (6) spectaculum (14) viderem (3). 5. Non (3) negligam (4) opus (13) ut (6) dominus (9) laudet (2). 6 Puero (7) lac (12) do (12) ut (6) valeat. 7. Filii (7) corpus sepeliam et flores (6) in (4) sepulchrum jaciam (4). 8. Venio (5) ut (6) epistolam (7) scribam (4). 9. Nonne (4) malum facis ut (6) fiat bonum. 10. Matrem (14) vocant (8) ut (6) poma (12) det (12). (Understand 'them' after 'det,' which ought to be expressed in Latin.)

B.

1. I am running-down (descend, 14) that (6) I may bring (12) the bread for my mother (14). 2. I was calling (11) the dog (14) because (7) he was worrying the cat (9). 3. Let me learn (6) (my) lessons (12) that (6) I may play (12). 4. I shall have (7) (my) dinner to-morrow if I may say (14) (Eng., say) (my) lessons (12). 5. The master (9) rouses-up (his) slave (7) that (6) he may shear (9) the sheep (8). 6. Shall I not (4) give (12) to my mother (14) a book (6) that (6) she may read (6) (it)? 7. I will not (3) hurt (4) my sister (8), because (7) she works (12) for (her) father (14). The boy (7) and (3) girl (8) were running (4) across (12) the road (11) that (6) they might (Eng. to) gather (pluck, 4) flowers (6) and (3) grapes (7). 9. He was telling the truth (5) to (his) master (13). 10. Shall we not (4) learn (6) (our) lessons (12) that (6) we may play (12)?

## LESSON XVI.

### ABLATIVE SINGULAR.

113. The forms used for the ablative singular are the original or crude forms (see par. 100), but I nouns have their ablative ending in 'e.'

The terminations then are—

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Ablative | a | o | i | u | e |
| | a | o | e | u | e |

which must be added to your scheme of nouns after the dative singular.

114. The uses of the ablative are, amongst others, to express (*a*) the time when, (*b*) the instrument with which, (*c*) the cause for which, (*d*) the place at which (generally with a preposition) anything is or is done.

115. If a preposition is found sometimes followed by an acc., and sometimes by an ablative, you will always notice that motion to is implied, when the acc. is used, and rest, or motion from, when the abl. is used.

116. The ablative must thus be parsed: 'Miles hieme gladio Ciceronem occidebat,' 'In winter the soldier was killing Cicero with a sword':—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gladio | N. | O | i | M. | S. | Ab. | Instrument. |
| Hieme | N. | I | is | F. | S. | Ab. | Time when. |

117. The Latin preposition 'in,' followed by an abl., is omitted when time is expressed; also when place is expressed, if the place be the name of a town or a small island, or the common words home, country, on service; *e.g.*, 'Carthagine' 'at Carthage,' but 'in Italia' 'in Italy.'

118. VOCABULARY 16.

| *English.* | *Latin.* | | *Derivative.* |
|---|---|---|---|
| In or on | In, prep. gov. abl. case | | |
| Winter | Hiems | G. Hiemis | |
| To make for | Petĕre | R. Pet | Petition |
| Summer | Æstas | G. Æstatis | |
| Rod or whip | Flagrum | G. Flagri, n. g. | Flagrant |
| Autumn | Auctumnus | G. Auctumni | |
| Gaul | Gallia | G. Galliæ | |
| Hither | Huc, adverb | | |
| Sword | Gladius | G. Gladii | Gladiator |
| Dart | Telum | G. Teli, n. g. | |
| Afterwards | Postea, adverb | | |
| And (closely coupling), que, hung on to second word | | | |
| To drive away | Repellĕre | R. Repell | Repulse |
| Carthage | Carthago | G. Carthaginis | |
| Briton | Britannia | G. Britanniæ | |
| Province | Provincia | G. Provinciæ | |
| In-the-morning | Mane, adverb | | |
| Sickle | Falx | G. Falcis | |
| Towards | Versus, prep. gov. acc. case | | |
| To cut | Secare | R. Sec | |
| Hill | Collis | G. Collis | |
| Waggon | Plaustrum | G. Plaustri, n. g. | |
| No-one | Nemo | G. Neminis | |
| People | Populus | G. Populi | Popular |
| To whip | Verberare | R. Verber | Reverberation |
| To persuade | Persuadēre | R. Persuad | Persuasion |
| To appear | Apparēre | R. Appar | Apparition |
| War | Bellum | G. Belli, n. g. | Bellicose |
| Club (stick) | Clava | G. Clavæ | |
| To wage | Gerĕre | R. Ger | |
| Under (rest) | Sub, prep. gov. ab. case | | Subject |
| Fear | Timor | G. Timoris | Timorous |
| To swim | Natare | R. Nat | Natation |

119. EXERCISE 16.

A.

1. Puella (8) canem (14) flagro vexat (15). 2 Hieme pueri (7) non (3) in flumine (5) natant. 3. Nonne (4) epistolam (7) ad (10) patrem (14) mittam (5) ut (6) huc veniat (5). 4. Hostes (10) gladiis telisque (telis que written as one word) repellebant et (3) provinciam virtute conservabant (10). 5. Messem (7) falce secabat et ad (10) granarium (12) plaustro ferebat (12). 6. Orator (8) populum voce (7) delectabat (5) sed (6) non (3) persuadebat ut (6) bellum gererent. 7. Horati, (6) corpus (15) in (4) aquam (7) hieme non (3) merges (8). 8. Æstate homines (5) in prato (11) jacent (13). 9. Hostium (10) timore ignes (13) non (3) incendunt (10). 10. Gallinæ (11) in nido (14) ova (11) ponunt (11) ut (6) pennis (14) tepident (10).

B.

1. The boy (7) writes (4) a letter (7) with his hand (8). In the autumn boys (7) swim in the river (5). 3. The soldiers (6) drive the enemy (10) back with swords and (que) darts. 4. In-the-morning the Gauls (10) appear on the hill, but (6) the Romans (10) were walking (3) toward the town (7). 5. No-one hurts (4) (his) son (7) with a club, but (6) Horace (6) whips his slave (7) with a rod. 6. Afterwards the general (2) reigns in (4) Britain, and (3) (his) ships (9) make for Gaul. 7. In the spring the general (2) will conquer (10) Africa (10) with his soldiers (6), and (3) seize (13) Carthage. 8. The lion (3) was tearing-to-pieces (11) the sheep (8) in the meadow (11). 9. Is he not (4) sowing (14) seeds (14) in the autumn that (6) he may reap (12) a harvest (7) in the spring? 10. He kills (4) his mother (14) with a sword and (3) buries (15) (her) body (15) under the tree (1).

120. EXAMINATION QUESTIONS. No. II.

What case in singular is similar to one in the plural? What is the usual position of the genitive singular with regard to the noun it limits? What letter does the dative singular really end in? How is 'ai' written in Latin? Distinguish carefully between a direct and an indirect object. Define the word 'dative.' How do you find the original or crude form of a noun? What do you mean by a consonantal noun? When do nouns of the I decl. make their gen. plur. in 'um' instead of 'ium'? State some of the uses of the ablative case. When is the prep. 'in' omitted with the ablative expressing place? Give meaning of 'in' when followed by abl. and acc. respectively.

*(To be continued.)*

# THE FOX AND THE WATCH-DOG.

*Words by* GEO. BENNETT. *Music by* T. CRAMPTON.

*Moderato. mf*

1st TREBLE.
2nd TREBLE.
BASS.
1. A sly old fox stole out one night, Thro' the woods so lone and drear; He knew his way with-
2. He made his way to Dobson's farm, And he thought, "They're all at rest; I'll fetch a gos-ling,
3. But watch-ful Tray so light-ly slept—He could hear a fall-ing leaf; And soon from out his
KEY G. Moderato. mf
D. t.
- out a light, For the gloom to him was clear: He brushed his coat with thorn-y briars, And he washed his face with
plump and warm, That's the fare I like the best. I'll find a way in yon-der roost Ere the cocks be-gin to
ken-nel crept, And he caught the cunning thief. He made short work of him, we're sure, For at noon the farm-er
f. G.
dew; And fresh and blithe, and sleek and lithe, The dim woods he hur-ried through; And fresh and blithe, and
crow; Old Tray's a-sleep, and in I'll creep—I can have my choice, I know; Old Tray's a-sleep, and
found The fox was dead, and at his head Lay the old watch-dog safe and sound; The fox was dead, and
sleek and lithe, The woods he hur-ried through.
in I'll creep—I'll have my choice, I know."
at his head Lay Tray, all safe and sound.
Symph.
Symph.

# Notes of a Lesson on Longitude.

BY JOSEPH H. COWHAM, F.G.S.,

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STANDARD V.

## INFORMATION.

### Revision of Lesson on Latitude.

(1) Latitude is distance north or south of the Equator.

(2) Latitude alone does not fix the absolute position of any place.

N.B.—The place whose latitude alone is given may be situated at any part of the parallel.

(3) Just as the Equator is the position from which we measure distance to the north or south of it on the globe, so we need a line drawn round the earth in an opposite direction from which to measure distance east and west of this given line.

### Mode of finding the lines which indicate distance East and West along the Parallels.

(1) The earth rotates on its axis from east to west once in twenty-four hours.

(2) As the earth rotates every part of any parallel will be directed immediately towards the sun **once** each rotation.

N.B.—The points *a*, *b*, *c*, *d*, *e* in the diagram are thus directed, and all at the same time.

(3) The line drawn through the points *a*, *b*, *c*, *d*, and *e* passes through the north and south poles, and marks the places on the different parallels which have midday at the same time.

*Term:*

The line thus drawn is called a **Meridian**.

N.B.—This term is applied because all places upon the Meridian have midday at the same time.

*Definition:*

A meridian is a circle drawn round a globe so that it passes through the poles and indicates all positions which have midday at the same time.

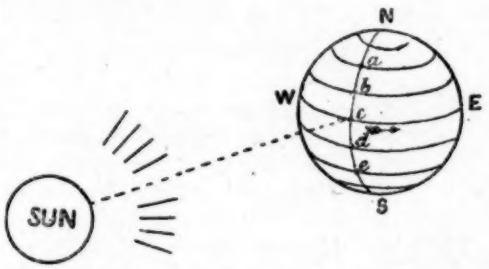
## METHOD OF TEACHING.

(1) Revise this portion of the lesson by use of the diagrams given last month.

(2) Show by placing letters on the parallels 30°, 45°, and 75° N. Lat. Then ask the class to state all they can as to the position of each letter on the globe.

(3) Refer to the mode of fixing the position of ⊙ on the blackboard by means of two lines drawn, one parallel to the bottom and the other parallel to the sides of the board, and drawn at right angles to one another.

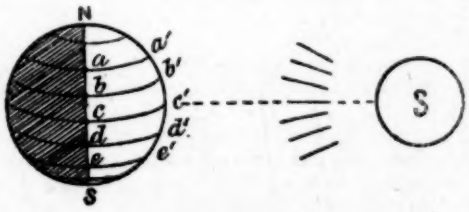
N.B.—The above was illustrated by diagram last month.




(1) This fact will be shown from the phenomenon of day and night.

(2) By means of the diagram.

This may be further illustrated by taking two globes or large balls—one to represent the earth in rotatory movement; the other, the sun, stationary. Then take a piece of string and fasten it to the poles of the globe standing for the earth. The string will represent the line cutting the parallels in *a*, *b*, *c*, *d*, and *e*.




N.B.—The diagrams illustrate the relative position of the sun and earth at the equinoxes.

Illustrate further by means of the above diagram, together with the globe and string.

(1) Place the string in the position *N. a, b, c, d, e, S.*; all would have the sun rising.

(2) Rotate the earth with the string until the position marked *N. a', b', c', d', e', S.* is reached. It is now midday at all these points.

(3) Supply the full definition after its several parts have been obtained from the class as a result of the teaching above.

**How to measure distance East and West of a given Meridian.**

(1) Each parallel can be divided like all circles into 360°.
As every part of each parallel is presented immediately to the sun every twenty-four hours. Then:—
(*a*) One half will be so presented in twelve hours.
(*b*) One fourth or 90° in six hours.
(*c*) 15° in one hour.
(*d*) 1° in four minutes.

(1) These sums would be worked out as a series of problems dependent upon a knowledge of First Grade Geometry.
Revise this knowledge by dividing a circle as indicated by (*a*), (*b*), and (*c*).

(2) In England we select the Meridian passing through Greenwich as the one from which we calculate distance to the east or west.

(2) This must be told; also that the French select the meridian of Paris, the Russians Pultowa, etc.

(3) *Examples:*
(*a*) If now a place to the east of Greenwich has midday four minutes earlier than Greenwich. What distance in degrees is that place east of Greenwich? Ans. 1°.
(*b*) Calcutta has midday nearly six hours earlier than Greenwich. How many degrees is it east of Greenwich? Ans. 90°.
(*c*) New York has midday almost five hours after Greenwich. What number of degrees is it west of Greenwich? Ans. 75°.

(3) If No. (1) is well understood these examples will offer no difficulty.

Other examples should be given, such as:—The time at a given town is 3 hrs. 12 min. earlier than Greenwich time. Find the longitude of this place.

**Longitude.**

The distance of a place east or west of Greenwich is the longitude of that place.
N.B.—The longitude is generally given in time and not in degrees.

This term must be supplied, and the meaning committed to memory. Similarly the definition of Meridian given above.

## The New Class-Subject, 'Elementary Science.'

*(What to teach, and how to teach it.)*

BY RICHARD BALCHIN.

IN last month's article will be found a reproduction of the first lesson on this subject for Standard I.

I now propose giving the subject-matter of the lessons which stand next in the detailed syllabus to be found in the February issue of this magazine. I feel, however, some little hesitation in doing so, on account of the extremely simple nature of the facts to be touched upon in this part of the course. Still, the plan of these articles would scarcely be complete if I did not cover the whole of the ground. Also, if I passed over lightly this part of the subject, it might be thought that I attach little importance to the work to be done in the First Standard, whereas the truth is, the teaching *here* is the most essential part of the whole business, and, I may add, the most difficult. It was therefore not without very good reason that Dr. Gladstone, a short time since, when I was about to give a lesson before him to my fifth standard, said he would greatly prefer seeing how I treated this subject of elementary science in the case of children in the First and Second Standards. Teachers of experience will, I am certain, agree with me that it requires a great deal more skill to give a lesson to the *First* Standard on "the meaning of a Bank-note," than it does to give the same lesson to the Sixth Standard.

It must be borne in mind that in each lesson the three or four facts I am now about to give form simply what I may call sign-posts in our half-hour's progress 'along the line of thought,' which must form the main feature of each lesson.

Following the subject—'Food generally; why we eat and drink,' we have:—

*(a)* 2.—BREAD.

(Objects exhibited: Wheat, barley, oats, flour.)

*Bread* = baked dough. *Dough* = flour, water, and ferment. *Wheat-flour* = ground seeds of wheat—a grass. Plain and bearded wheat: seeds arranged close around a central stalk. *Barley*, whole, and in meal, grains bearded: used mostly as malt for beer. *Oats*, whole and in meal: grains not close around a stalk, but on branches. Butter or treacle, good with bread: bread, for repairing waste, etc., and treacle and butter for giving heat. Best bread not quite white.

*(a)* 3.—MEAT.

(Objects exhibited: Pictures of ox, sheep, fowl, and fish.)

Meat is heat-giving and body-building food. Three varieties—Beasts, fish, birds.

1. Beasts: Ox—beef; sheep—mutton; pig—pork, bacon, ham.

2. Fish. (*a.*) River fish—eels, salmon. (*b.*) Sea-fish—herring, cod, plaice. Dried fish not such good food as fresh fish. Boiled fish better than fried.

3. Birds. Birds of prey not eaten, *i.e.*, vulture. Eatable birds—fowls, pheasants, turkeys.

*(a)* 4.—DRINKS.

(Objects exhibited: Glass of water, glass of beer—to be boiled and the spirit burned.)

All solid food must be dissolved before it can become part of the body. Digestion = making solids soluble.

*Water*, chief part of all drinks; not itself food. Other drinks = water and something else. Most food in milk.

*Spirit drinks*—beer, wines, gin, etc., must be regarded as various forms of adulterated water.

*Drinks without spirit* (infusions), tea, coffee, cocoa.

### *(a)* 5.—VEGETABLES.

(Objects exhibited: Pictures or specimens of the things mentioned.)

Meat by itself, not good; should have vegetables. Children under six require little or no meat.

Food vegetables of three kinds. 1. Foliage—cabbage, greens, spinage. Leaf-stalk—rhubarb. 2. Seeds—peas, beans. 3. Roots—turnips, carrots, radishes. Other parts of the plant: potato = kind of underground stem; cauliflower, a bunch of flowers or blossoms. Seeds contain most food materials. Half-pound of peas-pudding as much as two mutton chops.

### *(a)* 6.—FRUITS.

(Objects exhibited: An apple, orange, plum to be cut in halves; and pictures of other fruits.)

Fruits, an essential summer food. Fruit is some part of the flower or blossom grown to ripeness. Generally the seed-case, *i.e.*, apple, pear, orange, plum, gooseberry. Sometimes the fruit or seed case is on a juicy knob as the strawberry. Juicy knob generally considered the fruit.

Drinks made from fruits:—Cider, from apples; perry, from pears; wine, from grapes.

### *(b)* 1.—DRESS GENERALLY; WHY WE DRESS.

(Objects exhibited: Pictures of various national dresses.)

We dress in cold countries to *keep in* the warmth of the body; in hot countries to *keep out* the heat of the sun. No warmth in dress itself. All dress should allow perspiration to pass through. Dark colour for cold countries; light colour for hot. *All* articles of dress should be made of materials that can be washed.

Bad to wear things that 'hide the dirt'; want things to *show* the dirt when they are dirty.

### *(b)* 2.—MATERIALS FOR CLOTHING.

(Objects exhibited: Specimens of cotton, flax, wool, silk, fur, and leather.)

1. From plants. *Cotton*—seed-threads, calico. *Flax*—plant-fibre, linen; straw, corn-stalks, plaited.

2. From animals—wool, cloth, and flannel. Silk. Fur. Leather—hides of oxen and buffaloes, thick leather; skins of sheep and goats, thin leather.

### *(c)* 1.—FURNITURE: ARTICLES OF WOOD.

(Objects exhibited: Specimens of pine, mahogany, and oak; Pictures of the trees.)

(1) *Pine*, soft and cheap. Table, dresser, floor, cupboard, shelves. Fir-tree, a tall tapering evergreen. Wood often painted. Resin and turpentine.

(2) *Mahogany*, darker and harder than pine. Ornamental wood often cut into veneer. Book-case, drawers, sideboard. Often polished, never painted.

(3) *Oak*; very hard; beautiful figure or grain; carvings in oak very durable; fences, palings, posts, tubs.

### *(c)* 2.—FURNITURE: ARTICLES OF IRON.

(Objects exhibited: Iron ore; specimens of wrought and of cast iron.)

*Iron ore* from mines: melted in large furnaces; cast iron obtained. *Cast iron* brittle, cannot be hammered out nor drawn into wire. Fire-place, saucepans, etc. *Wrought-iron* can be bent, hammered out and drawn into wire. Fire-irons, scuttle, barrel-hoops, nails. Tin-kettle, etc. Tin, really sheet iron covered with tin. *Steel*, very fine kind of cast-iron, but can be bent and polished. Very hard. Knives, scissors, and tools generally.

### *(c)* 3.—FURNITURE: ARTICLES OF GLASS.

(Objects exhibited: White sand, soda, pearl-ash, lime, red-lead. Same mixed together. Picture of glass factory.)

Raw material of glass, 'Batch,' as above, put into earthen pots in a furnace. All melts. Lumps of glass taken out on the end of a tube.

Window glass, bottles, etc., *blown* glass. *For window* or sheet glass, a lump is taken upon end of tube and blown into a globe, which is whirled round rapidly while soft, and upon being opened flies into a sheet. Other ways of forming sheet glass. *Plate glass*; melted glass run out on very level tables; when cool is polished. Looking-glass and some window glass. Tumblers, decanters, etc., often shaped in moulds. Sometimes cut by grinding against a wheel.

### *(d)* 1.—MONEY: ITS USE.

(Objects exhibited: Coins, shells.)

In England, no man produces *all* he wants. Must exchange what he *does* produce for what he requires but does *not* produce. *Exchange* effected either by *barter*, or by employing *money* as a medium. The baker gives bread for money because *he* can obtain clothes or whatever he wants for that same money. Other commodities might be media of exchange besides metals. Metals most durable. Gold and silver the best metals for money, because they take up but little room in proportion to their value. Money no use if there is nothing to exchange.

### *(d)* 2.—COINS.

(Objects exhibited: Sovereign, shilling, penny.)

Gold, silver, and bronze, the metals used in England for money. 'Coins,' the name of the pieces of metal thus used. *Coining*, the making of coins. *Mint*, the coin factory. The sovereign consists of pure gold and a little copper to make it hard. One pound weight of gold will coin into forty-six sovereigns. Bronze is copper and tin, and is more valuable than copper.

### *(d)* 3.—A BANK-NOTE.

(Objects exhibited: A bank-note, and an enlarged picture of the same.)

*Bank*; a place where people keep their money to take it out again as they want it.

*Bank of England;* where the Government keeps its money, *i.e.*, the taxes; and from which it is drawn to pay the army, navy, judges, queen, princes, education of the people, etc.

*Bank-note;* promise of the bank to pay to anybody the sum named on the note; not money itself, but only a promise to *pay* money No one, not even a bank, should promise what they cannot perform.

In next month's article, I will reproduce a lesson given to the 'First Standard' upon 'The Stones of the Streets;' the subject which stands next on the syllabus.

(*To be continued.*)

—o—

## Lessons in English.

BY ALEXANDER BAIN, LL.D.

### VIII.—EMOTIONAL QUALITIES.

OUR present lesson is from Gray. His scanty collection of poems is one of the treasures of the English language; and furnishes examples of poetic style as well adapted for teaching as for solitary perusal. The judicious instructor will take to pieces a stanza here and there without detracting from the pleasure of the whole. The prevailing qualities of Gray's composition are prominent and agreed upon by critics.

I will take, as the subject of the lesson, the *Ode to Vicissitude*, which he left unfinished:

> Now the golden morn aloft
> Waves her dew-bespangled wing;
> With vermeil cheek and whispers soft
> She woos the tardy spring.

A valuable discipline might be imparted in connection with Gray's order of words, which is sometimes, but not always, the best for clearness and grace. In the clause made up by the two first lines, a more modern poet would probably introduce greater inversion. The present order is not the best for either prose or poetry. A thorough inversion would be highly poetical. "Now her dew-spangled wings aloft waves the golden morn;" this would of course need modification for the metre; but it represents the more typical arrangement in poetic style. The two concluding lines are better in point of arrangement; the last might be inverted—"the tardy spring she woos."

The personification of morn is finely sustained, condensed, and yet clear and harmonious. The description is sufficiently prolonged to make a good impression; the picture of wooing introduces the element of tenderness with supporting adjuncts. The compression of Gray is very remarkable; achieved, as it is, with so little obscurity and such choice and perfect keeping of imagery. All this we can set before our pupils as an ideal of perfection; to reproduce it in new composition would demand a portion of the author's genius and labour.

> Till April starts, and calls around
> The sleeping fragrance from the ground,
> And lightly o'er the living scene
> Scatters his freshest, tenderest green.

Practice may be made here of variations of order. Releasing ourselves from the necessities of metre, with a view to our experiment, we might transpose thus:—"till up starts April, and from the ground the sleeping fragrance around him calls: and, o'er the living scene, his freshest, tenderest green lightly scatters." This is a more complete departure from the prose form, and more nearly what our poets now-a-days make it; while the position of the circumstances is such as to favour the cumulative effect.

As the lines stand, it may be remarked the rhymes are perhaps too emphatic and not placed upon the words that have a corresponding emphasis in the sense. A good reader would have to reduce greatly the stress of the voice on "around," and "ground;" and although "scene" and "green" are important nouns, yet their accompanying adjectives are equally important, and in prose would be read with quite as much emphasis.

Once for all, attention may be called to Gray's repeated use of the co-ordinating adjectives as a means of condensation. The usage is very marked with him: "sleeping fragrance," "living scene," "tardy spring," "golden morn," etc., do not exhaust the cases in the eight lines we have quoted. Every one of these phrases is the co-ordinating clause, equivalent of a—"fragrance which is sleeping," etc.; that is quite different from the ordinary use of the adjective as qualifying or limiting the noun—"much or little fragrance." Now condensing devices may be overdone, especially in poetry, which should be readable without effort; and, it is not risking much to say that there are too many of these co-ordinating adjectives in one stanza.

> New-born flocks, in rustic dance,
> Frisking ply their feeble feet;
> Forgetful of their wintry trance,
> The birds his presence greet.

The personification of April is kept up; but we are not made aware of the fact till the concluding line. The order is still open to criticism; or at all events to experimental variation. The first two lines is a prose order; the lines might be advantageously transposed; "frisking ply their feeble feet, the new-born flocks in rustic dance." This would balance with the other two, and obviate the disposition that we have, from the present order, to apply the third line—"forgetful," etc., to the flocks. The last line might be shaped so as to make the inversion thorough-going—"his presence greet the birds." It seems to have been Gray's theory of inversions or departures from prose arrangement, that they have no intrinsic suit-

ability to poetry, but are simply to be used for the sake of variety. There is only one co-ordinating adjective in these lines, "feeble feet," and the stanza reads lighter in consequence. The rhyme is not too obtrusive for the sense. As usual with Gray, the choice of words is all that could be wished; giving an admirable picture, unchecked by discords of phrase. Two incidents are comprised in the four lines; yet we do not feel hurried by the transition; we can fairly take in the one before entering on the other. The second half of the stanza introduces the lark.

> But chief the sky-lark warbles high
> His trembling thrilling ecstasy;
> And, lessening from the dazzled sight,
> Melts into air and liquid light.

This more resembles the common habit of poets in making use of the lark; and is much preferable to spinning a long desultory ode. It comes well after the previous couplet on the bird tribe in general, being the eminent specialising instance. There is no stint of laudation; and the words are all expressive and close to the reality. First is given the position aloft; then the note and its effect; "trembling thrilling ecstasy" is appropriate as well as intense. The thing is done once for all; there is no enfeeblement from iteration or variation, which could hardly be maintained at so high a pitch. The next two lines take full advantage of the upward flight of the lark, and say the most that can be said for the effect of our following and losing him as he recedes aloft: "melts into air" is highly expressive and elated; "liquid light" is intended to add to the influence of the situation, but is of doubtful efficacy.

> Rise, my soul! on wings of fire,
> Rise the rapturous choir among;
> Hark! 'tis nature strikes the lyre,
> And leads the general song.

The bold apostrophe and the elevated phraseology of the two first lines touch the highest sublime. The energy of the cadence is at the same level. The third line is effective from the word "nature," which is at the once the commonest and the sublimest of terms. When so used as to suggest the collective universe, it has its greatest power; and the present combination 'strikes the lyre" is grand in itself and little hacknied. The concluding line is not couched in ambitious figures, and yet its simplicity is agreeable; the bare action is grand and effective without elaboration or adornment.

> Warm let the lyric transport flow,
> Warm as the ray that bids it glow,
> And animates the vernal grove
> With health, with harmony, and love.

We miss here the lucidity of the previous stanzas. The first line is plain enough: the second is not so plain—"warm as the *ray* that bids it glow." We discover no doubt that by the "ray" is meant the sun's radiance, but this is not apparent at first; and the defect in the suggestive force of the word is all the greater that it has to sustain the action of the two last lines. As in previous stanzas, the order seems too prosaic for the elevation of the strain. In the first line, we might have a more complete inversion—"Warm let flow the lyric transport"; and the third and fourth lines could be transposed with advantage. It would probably be still better if the whole arrangement were re-cast; the three last lines preceding, and the first reserved for the climax of the action.

These three eight-line stanzas are a preparation for the poet's theme, namely, vicissitude. The next stanza introduces it expressly, although still clothed in poetic circumstances.

> Yesterday the sullen year
> Saw the snowy whirlwind fly;
> Mute was the music of the air,
> The herd stood drooping by.

The two first lines are in the only lucid arrangement. There might be a slight change in the second; "The snowy whirlwind *saw* fly." The third line is the typical inversion preferred by poetry when the adjective is the predicate of a clause. The fourth line would have been more emphatic, if it had balanced with the third, and ended with "herd"; but the inversion—"stood by the drooping herd," where a verb comes first without an adverb, is somewhat of a licence, although not unknown to poetic diction. The climax might have been improved by putting the third line last; the subject has more energy, and the metre is more sounding. Rhetorical illustrations might be given from the choice expressions "sullen year" and "snowy whirlwind."

> Their raptures now that wildly flow,
> No yesterday nor morrow know;
> 'Tis man alone that joy descries
> With forward and reverted eyes.

The poetic style is here in abeyance; the attempt is to embody a doctrinal statement in the compression of metre, after the manner of Pope. The difficulties of the attempt are great; and our exhibition of the weak points is intended for instruction, and not for depreciation. Perhaps for "Their" we might have "*The* raptures now," etc. In the second line, Pope would have said—"*Nor* yesterday nor morrow know." In the third line, "'Tis man alone that joy descries," there is a taking for granted that the previous four lines put toward a representative selection of the lower animals, which is a little more than we were prepared for. The expression "joy *descries*" hardly meets the case; it is not the parallel of the position in previous lines, with reference to the animals; they are actually happy, and form no ideas of their happiness or misery yesterday or to-morrow; man, when happy, or the reverse, takes the past and the future also into the account. It cannot be said

that the poet is felicitous in the concluding line —"With forward and *reverted* eyes." For "reverted" we might suggest "with backward," for the sake of the more intelligible contrast; but this must have occurred to himself, and been rejected.

The lines furnish a good case for a prose paraphrase. There is no poetic diction to mangle or destroy; and an entirely new expression would have to be found, so as to give the thought with due explicitness, such as we look for in setting forth a doctrine possessing importance on its own account, and not depending for its interest on poetic adornment. But of this more afterwards.

Smiles on past misfortune's brow
Soft reflection's hand can trace;
And o'er the cheek of sorrow throw
A melancholy grace.

Gray usually prefers variation of order to the clearness of the parallel or balanced construction. The first couplet is a good poetical inversion. To balance it the second should have been cast differently. If we had the licence of prose we could put it as a participial adjunct, thus:—"casting a melancholy grace o'er the cheek of sorrow." The use of the possessive in words that are not names of persons is a poetic licence, and aids in compression; but should not be frequent.

While hope prolongs our happier hour,
Or deepest shades, that dimly lower
And blacken round our weary way,
Gilds with a gleam of distant day.

It seems captious to be continually quarrelling with the order of words in so consummate a poet, yet we cannot here refrain from suggesting the transposition of the fourth line to the place of the second:—

While hope prolongs our happier hour,
*And gilds with gleams of distant day*
Those deepest shades that dimly lower
And blacken round our weary way.

The poet is now engaged in bringing forward examples of his theme of Vicissitude. As yet he is very general; while embodying his generalities in poetic diction, which is, as usual, select and terse, even when not very original. He goes on—

Still, where rosy pleasure leads,
See a kindred grief pursue;
Behind the steps that misery treads,
Approaching comfort view.

The order here is in every way good; the two couplets are suitably balanced, and gain in clearness thereby. The remark is somewhat hypercritical, yet relevant, that in passing from pleasure followed by grief, to the obverse instance of misery followed by comfort, there should be a suitable conjunction, as "while." In prose, this could not be dispensed with. In the absence of such a word, we read the second couplet, as merely a various rendering of the idea in the first, until we come to "misery," which corrects us.

The hues of bliss more brightly glow
Chastised by sabler tints of woe;
And blended form, with artful strife,
The strength and harmony of life.

This comes in awkwardly as an expansion of the thought of the first couplet of the previous quotation. The second or obverse couplet should be considered as having closed that subject: but here it is re-opened for a new treatment over four lines. Nor can we commend the new arrangement as we did the previous. The poet himself gives us numerous precedents for such an order of the two first lines as this:—

Chastised by sabler tints of woe,
More brightly glow the hues of bliss.

The two last read perfectly well after this transposition (assuming the rhyme to be adjusted). Another arrangement of the second line is possible, if not preferable, putting aside metre.

By sabler tints of woe chastised.

We begin now to feel rather an excess of wordiness in the addition of these four lines. The previous twelve would have sufficed for iterating the poet's idea in the general form. This next stanza brings before us a more specific example.

See the wretch, that long has tost
On the thorny bed of pain,
At length repair his vigour lost,
And breathe and walk again.

The effect of these lines is sharp and decisive. The order might be theoretically more perfect, according to prevailing poetic usage, could it run—See the wretch that on pain's thorny bed long has tost; yet the change is unnecessary in the view of ready apprehension of the sense. It may be doubted whether the word "wretch" is admissible as the name for one that is a sufferer merely, and in no respect a vile person. The concluding line is good in sound, but does not correspond in meaning to the relief from the "thorny bed of pain," so well as the third line, and even that is not an exact reverse. To suit the mode of expressing the recovery, the illness should have been given more in the form of extreme lassitude, depression, and stagnation of vitality. Such at least would be the demands made upon a prose writer, in handling the situation.

The meanest floweret of the vale,
The simplest note that swells the gale,
The common sun, the air, the skies,
To him are opening paradise.

We have here, as regards the diction, a simple poetic selection of circumstances, without elevating comparisons or figures of any

importance. The drift of the lines would have been sooner seized, if the poet could have commenced with "To him." Indeed the last line could very well have been first, and the third second: for although the third contains large objects, fitting a climax, on account of their largeness, yet it is well understood that specification of interesting examples of a class stated generally, also forms an effective close.

Humble Quiet builds her cell
Near the source whence pleasure flows;
She eyes the clear crystalline well,
And tastes it as it goes.

We are now introduced to a contrast between two classes of men—the quiet and sober-minded, on the one hand, and the madly ambitious on the other. Postponing our reflections on the thought of the Ode, we here remark simply on the diction and order; and little need to be said on either, after the criticisms passed on previous stanzas. The order is remarkably simple; there is no inversion; and nothing would be gained by inversion. It does not answer to throw the subject of a sentence to the end, when the sentence is more expository than poetical; and when it contains in itself the entire exposition. The circumstances are all in fine keeping, or the verse would not be Gray's; the humility of Quiet is shown by her simple residence—a cell.

While far below the madding crowd
Rush headlong to the dangerous flood,
Where broad and turbulent it sweeps,
And perish in the boundless deeps.

The energy of the language and of the metre corresponds to the subject; and enhances the sweet and tranquil flow of the previous lines. We have here the contrast introduced by the conjunction desiderated in a previous stanza. The only thing wanting would be to bring "the madding crowd" up at once as the subject to balance "Quiet;" but anything like a close parallelism of circumstances and arrangement is scarcely attainable in poetry, and is seldom sought in the poetic embodiment of contrasts. The "And" at the beginning of the fourth line, is "Mason's" conjectural filling up of a gap in the unfinished stanza: "Thus" would have better suited the meaning.

Mark where Indolence and Pride,
Soothed by flattery's tinkling sound,
Go, softly rolling, side by side,
Their dull but daily round.

The poet's habit of compression is here aided by personifying abstract qualities. There is nothing specially remarkable in the diction; and the details are not less felicitous than usual. The language seems more suited to Indolence than to Pride; and although these qualities may be coupled in fact, yet Pride is supposed to carry with it a certain amount of energy, and is not commonly joined with dulness. The poet's moralising tendency sometimes leads him into feeble platitudes. The next four lines supply the contrast.

To these, if Hebe's self should bring
The purest cup from pleasure's spring,
Say, can they taste the flavour high
Of sober, simple, genuine joy?

We can now adduce the poet's own authority for a previous suggestion (stanza last but one). The intended contrast is made plain by the opening words, "To these," and the grammar throughout aids lucidity. We have had already the tasting of pleasure's spring, and could now dispense with it. There is a slight incongruity between "flavour high," and "sober, simple, genuine joy;" joy is not sober and simple, if it can also be described as high-flavoured. The poet next gives us a touch of his genius for the sublime.

Mark Ambition's march sublime
Up to power's meridian height;
While pale-eyed Envy sees him climb
And sickens at the sight.
Phantoms of danger, death and dread,
Float hourly round Ambition's head;
While spleen, within his rival's breast,
Sits brooding in her scorpion nest.

There is a tragic grandeur here, showing us how well sublimity starts from indignation and invective. The fifth and sixth lines might be transposed with advantage to the clearness—

Around Ambition's head there float
Phantoms of danger, death and dread.

The seventh would then admit of a change of order, beginning—

While, within his rival's breast.

The imagery in detail is scathing and fully sustained.

Happier he, the peasant, far,
From the pangs of passion free,
That breathes the keen yet wholesome air
Of rugged penury.
He, when his morning task is done,
Can slumber in the noontide sun;
And hie him home at evening's close,
To sweet repast and calm repose.

The intended contrast is decidedly announced by the commencing words—"Happier he." The relative in the beginning of the third line is at an unpleasant distance from the antecedent. Some doubts may be expressed as to the suitability of the conjunction—"breathing the *air* of *penury*." A variation might be tried in lines five and six:—

He, when done his morning task,
In the noontide sun can slumber.

So the seventh—

At evening's close can hie him home.

The Ode ends thus:—

He, unconscious whence the bliss,
Feels, and owns in carols rude,
That all the circling joys are his
Of dear Vicissitude.
From toil he wins his spirits light,
From busy day the peaceful night;
Rich, from the very want of wealth,
In heaven's best treasures, peace and health.

There is no poetic elevation here; only compact versification. The words, as usual, are well chosen for terseness, and the sense is perfectly clear. The first line needs a slight, and only a slight effort to catch the meaning, owing to the brevity. The "whence" is made to do duty for relative adverb and verb together—"whence arises or flows." Lines three and four are admirably managed for the climax in Vicissitude: the slight transposition of "his" would make the order perfect—

That *his* are all the circling joys.

The fifth line might be arranged thus—

From toil, his spirits light he wins.

The seventh line is a pungent epigram; after which the effect of the eighth is rather to dilute than otherwise.

So far, we have made, from the Ode, a lesson of diction, having dwelt in the first instance upon the order of the words, and next upon the harmony or keeping of the wonderfully choice language. We have also adverted to the arts employed to promote the prevailing feature of compression or brevity. For all these purposes, the detailed examination is useful. We could of course review the figures employed, and frame a lesson out of them; but this has been forborne in order to make an exercise out of the qualities that the Ode most prominently exemplifies.

We ought not to quit the consideration of the poem, without remarking upon the thoughts, or the subject-matter. A poem usually has a subject; the poetry, however, consisting in the treatment or language. Sometimes, the poet shows an evident wish to attach importance to the thoughts as such; and regards his work as a complex effect—partly of exposition, partly of decoration. Such is manifestly the case here; the Ode is an exposition of a vast and important theme—the influence, in human life, of change, alternation, or vicissitude. So important is this topic, that we should be interested by an exposition of it in the plainest prose. From this circumstance there might be a useful lesson of legitimate paraphrase: namely, to withdraw the subject entirely from the poetic form, and to clothe it in the garb of pure prose. This is very different from turning into prose the poet's own language, by a process of degradation and mangling. The whole arrangement as well as the diction of the poem would be departed from. The free licence of prose would be used to supply omissions, to redress exaggerations, to introduce qualifying circumstances, and to give examples suitable for exposition, though not for poetry. The paraphraser declines to run a race with the poet, in the treatment, but outrivals him in the strictly expository merits; with this exception, no doubt, that whatever aspect of the truth the poet conveys he impresses it more indelibly and more agreeably.

The subject of the present ode is a very tempting one. It lends itself not merely to interesting exposition, but also to energetic moral suasion. In the hands of preachers and poets, of all ages, it has been a grand instrumentality in the attempt to redress the ills of life, by helping either to explain them away, or to apply a remedy. The ills that we must endure are regarded as preparing for our greatest pleasures, inasmuch as these arise in the rebound from previous pains.

Gray's treatment of the whole subject in the present Ode must be pronounced very imperfect, and full of mistakes, which he coins into special pleadings. The three first stanzas are pure and admirable poetry: the remainder of the poem grows more and more expository, and less poetical. Generally speaking, he confounds two very different ideas: the alternation of states all pleasant in themselves, as healthy exercise and rest, excitement and quiet, society and solitude,—and the alternation of good and evil, which is no blessing at all. Very few of our pains are compensated for by the satisfaction that relief brings. The phrase "dear Vicissitude" is a misnomer. Vicissitude means the alternation of prosperity and adversity: there is nothing dear in that, however salutary as moral discipline.

The poet does not confine himself to the subject of Vicissitude or Alternation, in either of its two aspects. In his haste to moralise, and to correct the vicious and mistaken judgments of mankind, he introduces a third subject, the happiness of a humble lot, in contrast to the folly of ambition. This is quite a distinct line of reflection; it has nothing in common with the blessings of vicissitude. To apply these to the new case, the poet should have recommended the ambitious and aspiring man to change places for a time, and only for a time, with the humble and contented; because, by doing so, he would re-enter on his ambitious career with new zest.

*(To be continued.)*

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## ANSWERS TO ARITHMETICAL QUESTIONS IN 'THE SCHOLAR,' FOR APRIL, 1883.

### STANDARD IV.

A. 1. £2157 6s. 6¾d.
2. £2565 4s. 1½d. – 3.
3. 282,364 pk. 1 gal. 3 pt.

B. 1. 386,100 sec.
2. 1s. 11¾d. – 106.
3. 1,061,280 inches.

C. 1. £246 15s. 11d.
2. £619 0s. 10d.
3. 151,172 half farthings.

D. 1. 32,931,360 sq. in
2. 5040.
3. £4567 2s. 2½d.

E. 1. £25 15s. 7½d.
2. £25 5s. 4½d.
3. £6942 7s. 6d.

F. 1. £7 15s. 4½d.
2. £35,383 12s. 6d.
3. 758 wk. 19 hr. 59 m.

### ADVANCED EXAMINATION.

1. 56 vests.
2. 9 days.
3. £13950.

### STANDARD V.

A. 1. £973 12s. 11¾d.
2. £8 15s.
3. £4 15s. 5½d.
B. 1. £1517 12s. 5½d.
2. 3⅓.
3. £10 1s. 5½d.
C. 1. $\frac{17}{133}$.
2. £12,177 8s. 11½d.
3. £52 8s. 11½d.
D. 1. £5 15s. $7\frac{7}{16}$d.
2. 2½.
3. £41 8s. 7⅜d.

E. 1. $\frac{13}{133}$.
2. £37 17s. 9½d.
3. 8⅛ miles.
F. 1. £68.
2. £15,823 8s. 9d.
3. £12,503 2s. 2½d.

ADVANCED EXAMINATION.

1. £892 8s. 9¾d.
2. 4½.
3. 4½ days.

### STANDARD VI.

A. 1. $\frac{7}{11}$.
2. £2111 0s. $5\frac{8}{11}$d.
3. £34 5s. 6d.
B. 1. 465·3 feet.
2. ·0000375.
3. £169 12s.
C. 1. 768 days.
2. £31 10s. 1½d.
3. £4 18s. 5½d.
D. 1. ·73
2. 2000.
3. 6 hr. 24 min.

E. 1. £1098 7s. 0½d.
2. £436 13s. $11\frac{8}{11}$d.
3. 3·5438+d.
F. 1. $\frac{1}{11}$.
2. £7 18s. 4d.
3. ·2228+.

ADVANCED EXAMINATION.

1. 8⅛ days.
2. 15s. 1·7409+d.
3. $5\frac{1}{11}$ per cent.

### STANDARD VII.

A. 1. £352 18s. 3d.
2. 10s. 9½d.
3. $26\frac{8}{13}$.
B. 1. £156.
2. £10 15s. $8\frac{4}{7}$d.
3. 7½ per cent.
C. 1. £2 15s. $9\frac{5}{6}$d.
2. £76 3s. 9½d.
3. £743 5s. 7½d.
D. 1. 1s. 7½d.
2. £112 2s. 1·595904d.
3. 5 per cent.

E. 1. 14½ per cent.
2. £11 1s. 2½d.
3. 1,000,775.
F. 1. £775 bank stock.
2. £83 5s. 3·5142144d.
3. £770.

ADVANCED EXAMINATION.

1. 1d. each.
2. £5100.
3. £93 6s. 8d. gain.

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## ANSWERS TO ALGEBRA QUESTIONS IN 'THE SCHOLAR' FOR APRIL, 1883.

### EXERCISE XVIII.

(1) $7ab$. (2) $11xy^2z$. (3) $4mp^2$. (4) $7ab^2cd^2$. (5) $3x^2y^2z^2$. (6) $28a^2bxy^2$. (7) $a-b$. (8) $m+n$. (9) $6ab(x-y)$. (10) $27xy^2(x+y)$. (11) $3(x+y)$. (12) $6bx^2$. (13) $2x^2(a+b)$. (14) $x(a+x)$.

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## SOLUTIONS OF THE ADVANCED EXAMINATION QUESTIONS IN 'THE SCHOLAR' FOR APRIL, 1883.

### STANDARD IV.

1. 50 yds. = 800 nls., and 3 yds. 2 qrs. 2 nl. = 58 nls., ×8 = 464 nls. in the 8 coats. Then 800 − 464 = 336 nls. left for vests. 336 ÷ 6 nls. (each vest) = 56 vests. Ans.

2. 2 ac. 148 sq. yds. = 9828 sq. yds.; (12×6)+(5×8) = 112 sq. yds. dug per hour, and 112 × 9¾ = 1092 yds. per day. Then 9828 ÷ 1092 = 9 days. Ans.

3. 1½d. ×60 = 6s. 3d. a min. = (×60) £18 15s. an hr. = (×24) £450 a day = (×31) £13,950. Ans.

### STANDARD V.

1. £69 18s. 10½d. + £182 14s. + £288 + £36 15s. 11½d. + £315 = £892 8s. 9¾d. Ans.

2. $(\frac{1}{4}+\frac{2}{3}+\frac{1}{2}+\frac{3}{4}+\frac{4}{5}+\frac{5}{6}+\frac{9}{10})=$
$\left(\frac{60+80+30+72+100+105+108}{120}\right)=\frac{555}{120}=4\frac{75}{120}=4\frac{5}{8}$. Ans.

3. Bringing the cows and horses to their equivalents in sheep, we have 12 cows = 60 sheep, and 5 horses = 20 sheep, plus the 80 sheep = 160 sheep. As the hay lasts 40 sheep for 18 days, it will serve 160 sheep (just 4 times the number) for 4½ days. Ans.

### STANDARD VI.

1. As a shoe requires $\frac{7}{10}$ the work of a boot, a boot requires $\frac{9}{10}$ the work of a shoe, and as B can make a pair of shoes in 10½ hours, he will be $\frac{21}{2}\times\frac{9}{10}=15$ hours over a pair of boots. Again, $\frac{7}{10}$ of 10 = 7 pair of boots equivalent to the 10 pair of shoes, consequently the work required = 13 pair of boots. Then $\frac{7}{15}+\frac{1}{15}=\frac{8}{15}$ frac. of a pair of boots done per hour, and $13=\frac{780}{60}$, which ÷ by $\frac{8}{60}=86\frac{2}{3}$ hrs. = 8⅔ days. Ans.

2. 3·4⅝ lb. = $3\frac{45}{80}=3\frac{9}{16}$, 2·8⅜s. = 2⅞, and 18·46⅝ lb. = $18\frac{493}{800}$. Then $(2\frac{7}{8}\text{s.}\div3\frac{9}{16})\times18\frac{493}{800}=\frac{23}{8}\times\frac{16}{25}\times\frac{14493}{800}$
$=\frac{1449}{100}$s. 1·7409+d. Ans.

3. £900 − £765 = £135, int. of £765 (= 7·65 hundreds) for 3½ years. Then £135 ÷ (7·65 × 3½) = $5\frac{100}{153}$ per cent. Ans.

### STANDARD VII.

1. 9 eggs for 8d. = ¾d. each, at which price the eggs that cost £100 would sell for £112. But it is required that £100's worth (cost) should sell for £126, hence the selling price per egg will be $\frac{112}{126}$ of ¾d. = 1d. Ans.

2. Four per cent. *interest* for *half* a year = $\frac{1}{50}$ of the principal; and in *discount* as £100 would amount to £102 in 6 months, the discount is $\frac{2}{102}=\frac{1}{51}$ of the money dealt with. Then $\frac{1}{50}-\frac{1}{51}=\frac{1}{2550}$, the difference, but this difference is £2, hence the amount in consideration must be £2 × 2550 = £5100. Ans.

3. £8000 = 80 hundreds, making at 3 per cent. £240 a year. £92½ × 80 = £7400, amount realized on selling out. £25 + £2 15s. = £27 15s., cost of each £25 share. £7400 ÷ £27 15s. = 266⅔ shares bought. The interest on £25 (the nominal value of the shares) at 5 per cent. = £1¼, then £1¼ × 266⅔ = £333 6s. 8d., income from the shares; hence £333 6s. 8d. − £240 = £93 6s. 8d. gain. Ans.

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## ANSWERS TO ARITHMETICAL QUESTIONS IN 'THE LITTLE LEARNER' FOR APRIL, 1883.

### STANDARD I.

A. (1) 97
(2) 242
(3) 224
B. (1) 639
(2) 2,151
(3) 1,352
C. (1) 824
(2) 2,550
(3) 1,226
D. (1) 324
(2) 540
(3) 322
E. (1) 503
(2) 333
(3) 552
F. (1) 89
(2) 497
(3) 158
G. (1) 5,603
(2) 31,526
(3) 16,300
H. (1) 2,576
(2) 3
(3) 3,896
I. (1) 155
(2) 49 nuts
(3) 24,181,221
J. (1) 127 sheep
(2) 15,453,540
(3) 125 marbles

### STANDARD II.

A. (1) 75,161
(2) 359,307
(3) 106,699
B. (1) 58,485
(2) 6,244
(3) 90,193
C. (1) 294,472
(2) 819,698
(3) 6,493,550
D. (1) 2,740,392
(2) 4,785,633
(3) 32,275,680
E. (1) 74,504,481
(2) 2,159,813,440
(3) 6,419,442,830
F. (1) 15,697
(2) 23,420
(3) 7,881+5
G. (1) 3,987
(2) 8,705
(3) 7,956+10
H. (1) 8,937
(2) 1,065+421
(3) 5,768
I. (1) Ten thousand four hundred and ninety-two
(2) 92 pence; 70 pence; 114 pence
(3) 537
J. (1) 4,918 gross.
(2) 102 years
(3) 1,080 trees

## STANDARD III.

A. (1) 4,357
(2) 896+1
(3) 1,086

B. (1) 11,869+18
(2) 5,790
(3) 9,969+30

C. (1) 13,872+274
(2) 8,507
(3) 10,609

D. (1) 10,224+1,949
(2) 2,900
(3) 9,204+3,395

E. (1) £30 0s. 9d.
(2) £263 19s. 2½d.
(3) £1,171 10s. 10¾d.

F. (1) £9,407 3s. 4½d.
(2) £30,464 19s. 6½d.
(3) £180,782 7s. 11d.

G. (1) £428 16s. 9d.
(2) £679 17s. 9½d.
(3) £14 14s. 5¼d.

H. (1) £7,425 17s. 10½d.
(2) £2,192 18s. 4½d.
(3) £840 12s. 8¾d.

I. (1) 439
(2) £774 2s. 10½d.
(3) £3 17s. 10d.

J. (1) 3.038,654
(2) £297 7s.
(3) 4s. 11d.

# ANSWERS TO
# Pupil Teachers' Examination Papers.

## FEB., 1883.

## CANDIDATES.

*Three hours and a half allowed.*

### Arithmetic.

MALES.

1. Find by practice the cost of 2 qrs. 2 lbs. 12 ozs. 13 drs. at £1 10s. per lb.

| | | £ | s. | d. |
|---|---|---|---|---|
| Cost of 1 lb. | | 1 | 10 | 0 |
| | | | | 58 |
| ,, 2 qrs. 2 lbs., or 58 lbs. | = | 87 | 0 | 0 |
| ,, 8 ozs. = ¼ cost of 1 lb. | = | 0 | 15 | 0 |
| ,, 4 ,, = ½ ,, 8 ozs. | = | 0 | 7 | 6 |
| ,, 8 drs. = ½ ,, 4 ,, | = | 0 | 0 | 11½ |
| ,, 4 ,, = ½ ,, 8 drs. | = | 0 | 0 | 5¾ |
| ,, 1 ,, = ¼ ,, 4 ,, | = | 0 | 0 | 1 7/16 |
| | | £88 | 4 | 0 9/16. Ans. |

2. A bankrupt's debts amount to £3240, and he can pay 5s. 4d. in the £. What is the amount of his assets?

5⅓s. × 3240 = 17,280s. = £864. Ans.

3. If a person's estate be worth 2000 guineas per annum, and his land tax amounts to 2s. 9½d. in the £, what is his net annual income?

| | | £ | s. | d. |
|---|---|---|---|---|
| Total income | = | 2100 | 0 | 0 |
| 2s. 6d. per £ = ⅛ of total income | = | 262 | 10 | 0 |
| 3d. ,, = 1/10 of 2s. 6d. | = | 26 | 5 | 0 |
| ½d. ,, = ⅙ of 3d. | = | 4 | 7 | 6 |
| Total land tax | = | 293 | 2 | 6 |
| ∴ After paying tax, net income | = | £1806 | 17 | 6. Ans. |

4. If 24 men mow 60 acres in 10 days of 9 hours each, how many hours a day must 60 men work to mow 100 acres in 6 days?

60 men : 24 men
60 ac. : 100 ac.
6 das. : 10 das.
} :: 9 hrs. : ?

$$\frac{9 \text{ hrs.} \times 24 \times 100 \times 10}{60 \times 60 \times 6} = \underline{10 \text{ hrs.}} \text{ Ans.}$$

5. If an ordinary train going 36 miles an hour starts 24 minutes before an express train going 52 miles an hour, in what time will the latter overtake the former?

(*a*) 60 min. : 24 min. :: 36 miles : ?

$$\frac{36 \text{ mls.} \times 24}{60} = 14\tfrac{4}{5} \text{ mls., distance of ord. when exp. starts.}$$

(*b*) Now the express gains 16 miles in an hour; how long will it take to gain 14⅘ miles?

16 mls. : 14⅘ mls. :: 60 min. : time required.

$$\frac{60 \text{ min.} \times 72}{80} = \underline{54 \text{ min.}} \text{ Ans.}$$

FEMALES.

1. Make out the following bill:—

53¾ yds. Brussels carpet at 4s. 3d. per yard.
36¼ yds. Kidderminster carpet at 2s. 11d. per yard.
10½ yds. drugget carpet at 2s. 9d. per yard.
15¾ yds. matting carpet at 1s. 9d. per yard.

| | | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| 53¾ yds. at | 4 | 3 | per yd. | = | 11 | 7 | 4½ |
| 36¼ ,, | 2 | 11 | ,, | = | 5 | 7 | 2¾ |
| 10½ ,, | 2 | 9 | ,, | = | 1 | 8 | 10½ |
| 15¾ ,, | 1 | 9 | ,, | = | 1 | 7 | 6¾ |
| | | | | | 19 | 11 | 0. Ans. |

2. Find the cost of 29 tons 13 cwt. 3 qrs. 21 lbs. of hay at £5 6s. 8d. per ton.

| | | £ | s. | d. |
|---|---|---|---|---|
| Cost of 1 ton | = | 5 | 6 | 8 |
| | | | | 29 |
| ,, 29 tons | = | 154 | 13 | 4 |
| ,, 10 cwt. = ½ of 1 ton | = | 2 | 13 | 4 |
| ,, 4 ,, = ¼ ,, | = | 1 | 1 | 4 |
| | | 158 | 8 | 0 |
| Deduct ,, 7 lbs. = 1/320 ,, | = | | | 4 |
| | | 158 | 7 | 8. Ans. |

3. 31,743 at £56 10s. 7½d. each.

| | | £ | s. | d. |
|---|---|---|---|---|
| Price of 31,743 at £1 each | = | 31,743 | 0 | 0 |
| | | | | 56 |
| ,, ,, £56 ,, | = | 1,777,608 | 0 | 0 |
| ,, ,, 10s. = ½ prc. at £1 | = | 15,871 | 10 | 0 |
| ,, ,, 5d. = 1/24 ,, 10s. | = | 661 | 6 | 3 |
| ,, ,, 2½d. = ½ ,, 5d. | = | 330 | 13 | 1½ |
| | | 1,794,471 | 9 | 4½ |

4. A bag contains a certain number of half-crowns, twice as many florins, and three times as many shillings, and the whole sum in the bag is 19 guineas: find how many of each coin it contains.

| | s. | d. |
|---|---|---|
| For every coin at 2s. 6d. | = 2 | 6 |
| There are 2 coins at 2s. | = 4 | 0 |
| And 3 at 1s. | = 3 | 0 |
| Total | 9 | 6 |

∴ 19 gui. = 798 sixpences = 42 half-crs. Ans.
9½s. = 19 sixpences
Hence florins = 84. Ans.
And shillings = 126. Ans.

### Grammar.

1. Parse the words italicised in the following:—

'An old *man broken* with the storms of state
*Is come to lay* his bones among ye:
*Give him* a little earth for *charity*.'

SHAKESPEARE.

'*man*'—com. noun, mas., sing., nom., subj. of 'is.'
'*broken*'—complete part. of the irreg. trans. verb *break, broke, broken*, qual. 'man.'
'*is*'—(=has), irreg. intrans. or subst. verb *am, was, been*, indic., pres. indef., 3rd pers. sing., agr. with 'man, and forms with 'come' complete part. of *come, came, come*,
'*is come*'—perf. def. tense=has come.
'*to lay*'—irreg. trans. verb, *lay, laid, laid*, infin., pres. indef., gov. by 'is come.'
'*give*'—irreg. trans. verb, *give, gave, given*, imper. pres. plur., agr. with (*you*).
'*him*'—pers. pron. demonst., 3rd pers. sing., dat. case, or obj., gov. by (*to*).
'*charity*'—abstr. noun, neut., sing., obj. gov. by 'for.'

2. Into what different classes may adjectives of number be divided? Give examples of each.

Adjectives of number are divided into *cardinal*, as *one, two, three*, etc.; and *indefinite*, as *some, any, all, few*, etc. The adjectives *first, second, third*, etc., formed from the cardinal numeral adjectives, belong to the *distinguishing* class of adjectives.

3. Explain these terms: Intransitive verb; finite verb; perfect tense; passive voice.

An intransitive verb is one in which the action implied in the verb is confined to the actor, and does not pass over to an object; as, John *sleeps*; the men *run*.

A finite verb is any tense belonging to the indicative, potential, subjunctive, or imperative mood; as, He *died*; the boy *was*

*killed;* the man *will go;* if you *dare; learn* the lesson. No part of the infinitive mood or participles is finite.

A perfect tense is one which denotes the action implied by the verb as *completed;* as, *I have written; I have been taught.*

The passive voice is that form of a transitive verb which denotes that the *subject* of the sentence stands for the *object* of the action described by the verb; as, The mouse *was killed* by the cat.

### Geography.

1. Name and describe the principal lakes in England, Scotland, and Ireland.

The English lakes are mostly confined to the Cumbrian group of mountains. Windermere, the largest of them, is 10½ miles long, and is drained by the Leven. Ullswater is the second largest; whilst Bala, the largest in Wales, is four miles long, and is drained by the Dee. They are celebrated for their beauty, for being the resort of tourists, and for containing a species of fish called the *char*, which is esteemed as a luxury. The other principal lakes are *Bassenthwaite*, *Derwentwater*, *Thirlmere*, *Crummockwater*, *Loweswater*, *Ennerdale Water*, and *Wastwater*, in Cumberland; *Hawswater*, *Grasmere*, and *Rydal*, in Westmoreland; and *Coniston Water*, in Lancashire.

With the exception of Switzerland, there is no country in Europe more remarkable for its lakes than Scotland. They are in general small in size, but they are celebrated for their wild grandeur and great beauty. Loch Lomond, the largest of them, twenty-one miles long, five and half broad, and with an area of forty square miles, is deservedly praised for its beauty. The other principal lakes are *Loch Shin*, in Sutherland; *Loch Maree*, in Ross; *Lochs Ness*, *Oich*, and *Lochy*, connected by the Caledonian Canal; *Lochs Laggan* and *Ericht*, in Inverness; *Loch Rannoch*, *Loch Tay*, *Loch Earn*, *Loch Katrine* (famed for its romantic beauty and the grandeur of the approach to it through the deep gorge of the Trossachs); *Loch Awe* stretches from the foot of Ben Cruachan for twenty-three miles; *Loch Leven*, in Kinross; *St. Mary's Loch*, in Selkirkshire; *Loch Doon*, in Ayrshire; and *Loch Ken*, in Kirkcudbright.

The Irish lakes or loughs are numerous, and some of them extensive. *Lough Neagh*, in Ulster, is the largest in the British Isles: it is seventeen miles long, ten broad, and has an area of 153 sq. miles. Its waters are celebrated for their petrifying quality. The other principal lakes are *Corrib*, *Erne*, *Derg*, *Ree*, and *Mask*. *Lakes of Killarney*, in Kerry, being surrounded by the loftiest mountains in Ireland, are celebrated for their romantic scenery. Lough Derg has an island, on which is St. Patrick's Purgatory.

2. Say what you know about the Isle of Man, and the portions of the English, Scotch, and Irish coasts which lie nearest to it. *If you can*, draw a map to illustrate your answer.

The Isle of Man, situated in the Irish Sea, is twenty miles from the coast of Scotland, and nearly equidistant from England and Ireland. It is governed by its own laws, administered by two supreme judges called deemsters. The principal towns are Castletown, Douglas, Ramsey, and Peel. Snaefell is the highest point in the mountains which traverse the island from N. to S. Wigtown, the part of Scotland nearest to it, is made up of two irregular peninsulas, the *Rhinns* of Galloway, west of Loch Ryan and Luce Bay, and the *Machers*, between Wigtown and Luce Bays. Cumberland, on the English coast, is separated from Scotland by the Solway Firth. From Walney Island, opposite the important town of Barrow, to St. Bees Head the coast-line runs N.W., but beyond St. Bees it extends N.E., and the rugged cliffs gradually decrease in elevation till we reach the marshy tracts of Solway Moss.

Opposite the island on the Irish side is the County Down, the coast of which is deeply indented by the Belfast Lough, Strangford Lough (which forms a good harbour, entered by a narrow channel 6 miles long), Dundrum Bay, and Carlingford Bay.

3. What counties are noted for cider-making, and for the growth of hops? Say what you know about each of them.

The counties noted for cider-making are Devon, Somerset, and Gloucester.

The surface of Devon is varied and mountainous. *Exmoor* in the N., and *Dartmoor* in the S., are wild and sterile; the highest point is *Yes Tor*. The rivers *Exe*, *Teign*, and *Dart* flow S.; *Torridge* and *Taw* flow N. The vale of Exeter is one of the richest tracts in the kingdom, and South Devon is very fertile. Devonshire is sometimes called the 'Garden of England.'

Somerset is low and marshy along the river courses; hilly in the west, where are Exmoor, Dunkerry Beacon, and the Quantock Hills, and in the north, where are the Mendip Hills. The Parret and Tone flow northward through the centre of the county.

Gloucester is traversed through the centre by the Cotswold Hills and the river Severn; in the west is the Forest of Dean.

Hops are grown in Kent, Hertford, and Surrey.

Kent is partly a peninsula, having the Thames on the north, and the Strait of Dover on the east and south-east. The surface is undulating, traversed by the North Downs. The rivers are the Medway, flowing north, and the Stour, N.E. The soil is extremely fertile.

Hertford, or Herts, separated from Bedford by the Chiltern Hills, presents some of the finest scenery in England; its breeds of sheep and cattle are celebrated for their excellence.

Surrey lies between Sussex and the Thames. The North Downs run through it. An extensive tract of the county is under tillage; besides hops, a large portion is devoted to gardens, which supply London with vegetables.

### Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Ventidius.*

Write, in small hand, as a specimen of copy-setting, *Cæsar's sister is called Octavia.*

### Dictation.

*(For the Examiner.)*

The passage should be read *once* distinctly, and then dictated *once*, in portions as marked.

It is essential that there be no complaint on the part of the candidates that they could not hear or understand: you can only prevent this by clearness, accuracy, and audibility.

Write the following passage from dictation:—

When I was just preparing | to pay my attendance | on the Emperor, | a considerable person at Court | (to whom I had been very serviceable, | at a time | when he lay under the highest displeasure | of his Imperial Majesty) | came to my house | very privately at night, | in a close chair, | and without sending his name | desired admittance. | The chairmen were dismissed; | I put the chair | with his lordship in it | into my coat pocket; | and giving orders to a trusty servant | to say that I was indisposed | and gone to sleep, | I fastened the door of my house, | placed the chair on the table | according to my usual custom, | and sat down by it. | After the common salutations were over, | observing his lordship's countenance | full of concern, | and inquiring into the reason, | he desired I would hear him | with patience, | in a matter that highly concerned | my honour and life.

### Music.

*A quarter of an hour allowed for this paper.*

1. Write below each of the following notes its pitch-name (C or *Do*, &c.).

1.

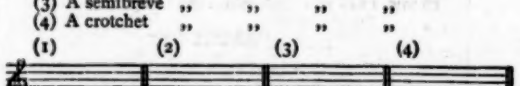
C F A D B G E C

2. Write against each of the following the answer required:—
(1) How many semiquavers are equal to a minim?
(2) How many quavers are equal to a semibreve?
(3) How many crotchets are equal to a semibreve?
(4) How many demisemiquavers are equal to a minim?

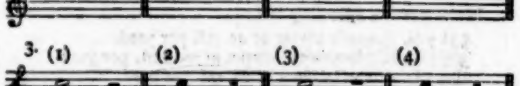
2. (1) Eight. (2) Eight. (3) Four. (4) Sixteen.

3. Write on the following stave:—
(1) A minim followed by its corresponding rest.
(2) A quaver " " " "
(3) A semibreve " " " "
(4) A crotchet " " " "

(1) (2) (3) (4)



3. (1) (2) (3) (4)



## FIRST YEAR.

*Three hours and a half allowed.*

### Arithmetic.

MALES.

1. What part of $4\frac{4}{5}$ of £8 4s. $9\frac{1}{2}$d. is $1\frac{6}{16}$ of £7 1s. 3d.?

$$\frac{1\frac{6}{16} \text{ of £7 1s. 3d.}}{4\frac{4}{5} \text{ of £8 4s. } 9\frac{1}{2}\text{d.}} = \frac{\frac{22}{16} \text{ of 3390 halfd.}}{\frac{24}{5} \text{ of 3955 halfd.}}$$

$$= \frac{3390 \times 21 \times 8}{3955 \times 16 \times 35}$$

$$= \underline{\frac{9}{470}}. \text{ Ans.}$$

2. Find the value of $\frac{5\frac{1}{2} - 4\frac{3}{8}}{4\frac{3}{8} + 8\frac{1}{4}}$ of $5\frac{3}{8} + \frac{1\frac{3}{4} \text{ of } \frac{9}{10}}{3 \div \frac{3}{8}}$

$$\left(\frac{\frac{21}{4} - \frac{14}{3}}{\frac{35}{8} + \frac{49}{6}} \times \frac{43}{8}\right) + \left(\frac{\frac{5 \times 9}{3 \times 10}}{\frac{3 \times 9}{4}}\right) =$$

$$\left(\frac{63 - 56}{12} \div \frac{105 + 196}{24} \times \frac{43}{8}\right) + \left(\frac{3}{8} \times \frac{4}{27}\right)$$

$$\frac{7}{12} \times \frac{24}{301} \times \frac{43}{8} + \frac{1}{18} =$$

$$\frac{1}{4} + \frac{1}{18} = \underline{\frac{11}{36}} \text{ Ans.}$$

3. Define a decimal. Convert $\frac{3}{128}$ and $\frac{5}{81}$ into decimals, and 1·216 and ·14545 into vulgar fractions in their lowest terms.

A decimal (*decimus*, tenth) fraction is one which has 10 or any power of 10 (100, 1000, 10,000, etc.) as its denominator; but in place of writing this denominator, the number of ciphers is shown by the position of a point which is called the *decimal point;* thus, $\cdot 235 = \frac{235}{1000}$; all figures to the left of the point are integers; as, $2 \cdot 4 = 2\frac{4}{10}$.

(*a*) $\frac{3}{128} =$ ·0234375 Ans. | (*c*) $1 \cdot 216 = 1\frac{216}{1000} = \underline{1\frac{27}{125}}$. Ans.

(*b*) $\frac{5}{81} =$ ·061728395 Ans. | (*d*) $\cdot 14545 = \frac{14545}{100000} = \underline{\frac{2909}{20000}}$. Ans.

4. What decimal of a £ is ·15625 of a guinea – ·625s.?

·15625 gui. = 3·28125s.
deduct ·625s.

20 | 2·65625s.
·1328125. Ans.

5. A person left $\frac{3}{8}$ of his property to his eldest son, $\frac{2}{5}$ of the remainder to his second son, $\frac{1}{3}$ of the remainder still left to his third son, and the rest, which amounted to £3600 to his daughter. What were the shares of each son?

Share of eldest son = $\frac{3}{8}$ = $\frac{12}{40}$
,, ,, 2nd ,, = $\frac{2}{5}$ of $\frac{5}{8}$ = $\frac{1}{4}$ = $\frac{10}{40}$
,, ,, 3rd ,, = $\frac{1}{3}$ of $\frac{3}{8}$ = $\frac{3}{40}$
,, ,, daughter = $\frac{3}{40}$

∴ whole property $= \frac{£3600 \times 40}{6} = £24000$

£
$\frac{3}{8}$ of £24000 = 9000 share of eldest son
$\frac{1}{4}$ ,, ,, = 6000 ,, ,, 2nd ,,
$\frac{3}{40}$ ,, ,, = 5400 ,, ,, 3rd ,,

FEMALES.

1. If a piece of calico, measuring $49\frac{1}{2}$ yds. cost £1 os. $8\frac{1}{2}$d., find the value of 13 pieces, of the same quality, averaging $51\frac{1}{2}$ yds. each piece.

$49\frac{1}{2}$ yds. : $51\frac{1}{2}$ yds. × 13 :: £1 os. $8\frac{1}{2}$d. : ?

$$\frac{995 \text{ farths.} \times 13 \times 51\frac{1}{2}}{49\frac{1}{2}} = \frac{995 \text{ farths.} \times 669\frac{1}{2} \times 4}{199}$$

$$= 5 \text{ farths.} \times 2678$$

$$= \underline{£13\ 18\text{s. } 11\frac{1}{2}\text{d.}} \text{ Ans.}$$

2. If 8 men, working $10\frac{1}{2}$ hours a day, earn 14 guineas in 7 days, in how many days will 10 men, working 9 hours a day, earn £27?

10 men : 8 men
9 hrs. : $10\frac{1}{2}$ hrs.
$£14\frac{7}{10}$ : £27
:: 7 days : ?

$$\frac{7 \text{ das.} \times 8 \times 21 \times 27}{10 \times 18 \times 14\frac{7}{10}} = \underline{12 \text{ days.}} \text{ Ans.}$$

3. A person bequeathed £5,707 10s. to be divided between his two sons, in the ratio of $5\frac{1}{2} : 6\frac{1}{2}$. What were their respective shares?

$5\frac{1}{2} + 6\frac{1}{2} = 12$.

∴ the one receives $5\frac{1}{2}$ parts out of every 12
and the other ,, $6\frac{1}{2}$ ,, ,, ,,

£ s. d.
12 : $5\frac{1}{2}$ :: £5707 10s. : 2615 18 9 1st.
12 : $6\frac{1}{2}$ :: £5707 10s. : 3091 11 3 2nd.

4. If a wall 660 yds. long, 10 ft. high, and $22\frac{1}{2}$ inches thick, be built by 27 men in $31\frac{1}{2}$ days of 11 hours each, in how many days of 12 hours each would 60 men build a wall, 12 ft. high and $2\frac{1}{2}$ ft. in thickness, round a park $4\frac{1}{2}$ miles in circumference?

$4\frac{1}{2}$ miles = 7920 yds.

660 yds. : 7920 yds.
10 ft. : 12 ft.
$22\frac{1}{2}$ in. : 27 in.
60 men : 27 men
12 hrs. : 11 hrs.
:: $31\frac{1}{2}$ days : ?

$$\frac{125 \text{ das.}}{4} \times \frac{7920 \times 12 \times 54 \times 27 \times 11}{660 \times 10 \times 45 \times 60 \times 12} = \underline{222 \text{ days } 9 \text{ hrs.}} \text{ Ans}$$

### Grammar.

1. 'For he to-day that sheds his blood with me
Shall be my brother; be he ne'er so vile
This day shall gentle his condition.'
—SHAKESPEARE. *Henry V.*

Parse all the nouns and adverbs in the above.

'*To-day*'—adv. of time mod. 'sheds.'
'*blood*'—com. noun, neut., sing., obj., gov. by 'sheds.'
'*brother*'—com. noun, mas., sing., nom. after 'shall be,' in app. with 'he.'
'*ne'er*'—adv. of degree, mod. 'so.'
'*so*'— ,, ,, ,, 'vile.'
'*day*'—abstr. noun, neut. sing. nom. subj. of 'shall gentle.'
'*condition*'—abstr. noun, neut. sing. obj., gov. by 'shall gentle.'

2. Mention pronouns that are used both adjectively and substantively. Give examples of their use in each capacity.

'This' (*pl.* these), 'that' (*pl.* those), 'which,' and 'what,' are used both adjectively and substantively; as, 'This book,' 'that book,' 'which book?' 'what book?' 'give him this,' 'take that,' 'which will you take?' 'what do you say?'

3. In what respect do prepositions resemble conjunctions, and in what respects do they differ?

Prepositions, like conjunctions, show relations; but the former show the relation of one *notion* to another, while the latter show the relation of one *thought* to another. A preposition is a word prefixed to a noun or its equivalent to make up a a qualifying or adverb phrase. This definition effectually separates prepositions from conjunctions, for the latter cannot be used with a noun to form a qualifying phrase.

### Geography.

1. Draw a full map of the basin of the Rhine.

2. Name and describe the islands in the Mediterranean Sea.

The islands in the Mediterranean are:—The Balearic Isles, east of Spain (principal, Majorca, Minorca, Iviça, and Formentera); the Sardo-Corsican group, W. of Central Italy (principal, Sardinia, Corsica, Elba); the Sicilian group, S. of Italy (principal, Sicily, Lipari Isles, Ustica, and Pantellaria); the Maltese group, consisting of Malta, Gozo, and Comino; the Illyrian Archipelago; the Dalmatian Archipelago on the W. of Dalmatia; the Ionian Islands, W. of Greece; Eubœa or Negropont, E. of Livadia; the Cyclades, E. of Morea; the Sporades, N. of Eubœa; Candia, S.E. of the Morea; and Cyprus and Rhodes, in the Levant.

### History.

1. Give the dates of George I.; James I.; Richard I.; Edward I.; Mary I.; and name their immediate successors.

George I. reigned from 1714 till 1727, and was suc. by George II.
James I. ,, ,, 1603 ,, 1625, ,, ,, ,, Charles I.
Richard I. ,, ,, 1189 ,, 1199, ,, ,, ,, John.
Edward I. ,, ,, 1272 ,, 1307, ,, ,, ,, Edward II.
Mary I. ,, ,, 1553 ,, 1558, ,, ,, ,, Elizabeth.

2. To what families did the sovereigns named above belong? and from what countries did those families spring?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| George I. | of the | House | of | Hanover, | sprang | from | Germany. |
| James I. | ,, | ,, | ,, | Stuart | ,, | ,, | Scotland. |
| Richard I. | ,, | ,, | ,, | Anjou | ,, | ,, | France. |
| Edward I. | ,, | ,, | ,, | ,, | ,, | ,, | ,, |
| Mary I. | ,, | ,, | ,, | Tudor | ,, | ,, | Wales. |

3. Write out a list of our sovereigns from 1759 to the present time with

George III. reigned from 1760 till 1820.
George IV. ,, ,, 1820 ,, 1830.
William IV. ,, ,, 1830 ,, 1837.

Queen Victoria has reigned from 1837 till the present time.

### Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Ventidius*.

Write, in small hand, as a specimen of copy-setting, *Cæsar's sister is called Octavia.*

### Composition.

(*For the Examiner.*)

The passage should be read *once* distinctly, and then the substance of it is to be written down from memory by the pupil-teacher.

(*For Pupil-Teachers at the End of the First Year.*)

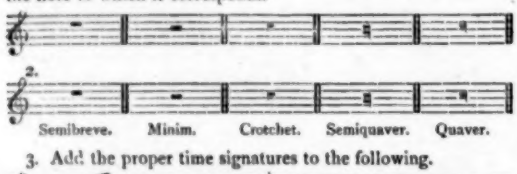
In one of the prettiest spots in Surrey, on the crown of the wooded hills which stretch from Dorking to Guildford, a goat-farm has been established to supply the London market. A small farm of a hundred acres has been rented, and is stocked with more than a hundred goats. They are milked morning and night, but in spring they will be milked thrice daily. The average yield per diem of each goat is not more than three pints. The demand is great; if two hundred gallons a day could be supplied it would all be taken up at prices varying from eighteen pence to two shillings a quart.

### Music.

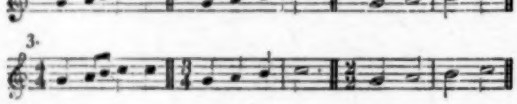
*A quarter of an hour allowed for this paper.*

1. Write under each of the following intervals its name (major third, minor third, perfect fourth, and so on).

2. Write under each of the following rests the value-name of the note to which it corresponds.




3. Add the proper time signatures to the following.




## SECOND YEAR.

*Three hours and a half allowed for this Paper.*

### Arithmetic.

MALES.

1. Find the exact difference between the simple and compound interest on £2,800 for 3 years at 3 per cent. per annum.

(*a*) Simple interest = £2,800 × 3 × $\frac{1}{100}$ = £252.

(*b*) The compound interest is found by adding $\frac{1}{100}$ of the principal thus:—

| | £ | |
|---|---|---|
| | 2800 | Principal to begin with. |
| $\frac{1}{100}$ | 84 | |
| | 2884 | ,, at beginning of 2nd year. |
| $\frac{1}{100}$ | 86·52 | |
| | 2970·52 | ,, ,, 3rd year. |
| $\frac{1}{100}$ | 89·1156 | |
| | 3059·6356 | Amount at end of 3rd year. |
| | 2800 | Principal at first. |
| | 259·6356 | Interest at the end of 3rd year. |

Simple interest 252

7·6356 Exact difference required.

£7·6356 = £7 12s. $8\frac{88}{125}$d. Ans.

2. What sum of money will amount to £609 3s. 4d. in $2\frac{1}{2}$ years at 3 per cent. per annum, simple interest?

Interest of £100 for $2\frac{1}{2}$ years at 3 p.c. = £$7\frac{1}{2}$.
Amount ,, ,, ,, ,, = £$107\frac{1}{2}$.

∴ £$107\frac{1}{2}$ : £$609\frac{1}{3}$ :: £100 : ?

$$\frac{£100 \times 3655 \times 2}{6 \times 215} = £566\ 13s.\ 4d.$$ Ans.

3. In what time will the simple interest on £750 12s. 6d. at $4\frac{1}{10}$ per cent. per annum amount to £20 5s. $4\frac{1}{10}$d.?

£20 5s. $4\frac{1}{10}$d. = $4864\frac{1}{10}$d.; £$4\frac{1}{2}$ = 1080d.

£$750\frac{1}{2}$ : £100
1080d. : $4864\frac{1}{10}$d. } :: 1 yr. : ?

$$\frac{1\text{ yr.} \times 100 \times 4864\frac{1}{10}}{750\frac{1}{2} \times 1080} = \frac{1\text{ yr.} \times 800 \times 97{,}281}{21{,}600 \times 6005}$$

$= 7\frac{1}{5}$ mos. Ans.

4. A man lends £100 at 5 per cent., £200 at $4\frac{1}{2}$ per cent., and £300 at $3\frac{1}{2}$ per cent.; what is the average percentage of interest that he get for his money?

£100 at 5 p.c. = 5
£200 ,, $4\frac{1}{2}$ ,, = 9
£300 ,, $3\frac{1}{2}$ ,, = $10\frac{1}{2}$

∴ £600 brings in all $24\frac{1}{2}$

*i.e.*, £600 ,, ,, $4\frac{1}{24}$ p.c. Ans.

5. A and B join in partnership, A with £600 and B with £500; at the end of 4 months A adds £200 to his capital, and B £450 to his. How should a gain of £92 in the first year be divided between them?

| | £ |
|---|---|
| A $(600 \times 4) + (800 \times 8)$ = | 8800 |
| B $(500 \times 4) + (950 \times 8)$ = | 9600 |
| | 18400 |

A's share = $\frac{8800}{18400}$ of £92 or 44. Ans.
B's ,, = $\frac{9600}{18400}$ ,, ,, 48. Ans.

FEMALES.

1. Find the value of $4\frac{5}{8}$ of 3 yds. 1 ft. 5 ins., and simplify $5\frac{5}{8} - 4\frac{1}{4} + 3\frac{1}{2} - 2\frac{7}{100}$.

(*a*)

| yds. | ft. | ins. | |
|---|---|---|---|
| 3 | 1 | 5 | |
| | | $4\frac{5}{8}$ | |
| 9 \| 17 | 1 | 1 | |
| 1 | 2 | $9\frac{1}{2}$ | |
| 13 | 2 | 8 | |
| 15 | 2 | $5\frac{1}{2}$. Ans. | |

(*b*)

$5\frac{5}{8} = 5\frac{50}{80}$
$-4\frac{1}{4} = 4\frac{20}{80}$
By subtracting $1\frac{30}{80}$
$+3\frac{40}{80}$
By adding $4\frac{70}{80}$
$-2\frac{7}{100}$
By subtracting $2\frac{1}{400}$. Ans.

2. A person with £$10\frac{9}{16}$ in his purse pays away £$2\frac{7}{15}$ and £$1\frac{3}{4}$; and after receiving £$3\frac{13}{20}$, pays away £$7\frac{1}{2}$; how much should he have left?

| Money received. | | | | Money paid away. | | | |
|---|---|---|---|---|---|---|---|
| £ | £ | s. | d. | £ | £ | s. | d. |
| $10\frac{9}{16}$ = | 10 | 6 | 3 | $2\frac{7}{15}$ = | 2 | 11 | 8 |
| $3\frac{13}{20}$ = | 3 | 9 | $0\frac{1}{2}$ | $1\frac{3}{4}$ = | 1 | 7 | 6 |
| | 13 | 15 | $3\frac{1}{2}$ | $7\frac{1}{2}$ = | 7 | 16 | 0 |
| | | | | | 11 | 15 | 2 |
| | | | | Balance | 2 | 0 | $1\frac{1}{2}$. Ans. |

3. Express $\frac{11}{16}$ of 3 hours 51 mins. as the fraction of 1 hour 14 mins. 15 secs.

$$\frac{\frac{11}{16}\text{ of }231\text{ mins.}}{74\frac{1}{4}} = \frac{15 \times 231 \times 4}{16 \times 297}$$

$= \frac{15}{16} = 2\frac{11}{16}$. Ans.

4. Into how many shares has £120 been divided, when each share amounts to £3 8s. $6\frac{3}{4}$d.?

$$\frac{£120}{£3\ 8s.\ 6\frac{3}{4}d.} = \frac{28{,}800d.}{822\frac{3}{4}d.} = \frac{201{,}600}{5760} = 35\text{ shares.}$$ Ans.

## Grammar.

1. Distinguish between a phrase and a sentence, and give examples of each.

'More things are wrought by prayer
Than this world dreams of . . . Wherefore let thy voice
Rise like a fountain for me night and day.'—TENNYSON.

(*a*) Give the sense of the above in plain, simple words of your own.
(*b*) Analyse the first two sentences.
(*c*) In what different ways may the words *let* . . . *rise* in the above be parsed? In which way would you parse them?
(*d*) Point out all the words in the above which are in the objective case, and explain the government of each.

1. A sentence is a complete thought expressed in words; as, *The examination took place on the 24th of February. Let thy voice rise like a fountain.* A phrase is a group of words grammatically connected but not expressing a complete thought; as, *On the 24th of February; like a fountain.*

(*a*) As I believe that prayer works greater changes than the worldly-minded imagine, I beseech you to pray for me continually.
(*b*) 1. More things are wrought by prayer . . . *Principal sentence.*
2. than this world dreams of . . . *subord. adv. sent.*

| | (1) | (2) |
|---|---|---|
| (*a*) Subject | things | world. |
| Enlarg. of subject | more | this. |
| Predicate | are wrought | dreams of. |
| Extension of pred. | by prayer | than (connective). |

(*c*) 'Let rise' might be parsed as 3rd pers., sing., pres. imperative, but it is preferable to parse them separately, thus:—
'*Let*'—irreg. trans. verb, *let, let, let*, imper., pres., 2nd pers., sing., agr. with subj. (*thou*).
'(*to*) *rise*'—irreg. intrans. verb, *rise, rose, risen*, infin., pres., indef., gov. by let—'to' being suppressed after 'let.'

(*d*)

| | | | | | |
|---|---|---|---|---|---|
| Prayer | is | in the obj., | gov. by the | prep. | 'by.' |
| voice | ,, | ,, | ,, | ,, | trans. verb 'let.' |
| fountain | ,, | ,, | ,, | ,, | prep. (to). |
| me | ,, | ,, | ,, | ,, | for. |
| night } day } | ,, | ,, | ,, | ,, | (by). |

## Geography.

*Answer either* Q. 2 *or* Q. 3; *not both.*

1. Give notes of a lesson on Newfoundland, Nova Scotia, and New Brunswick. Illustrate your lesson by a full map, and insert the lines of latitude and longitude.

NEWFOUNDLAND, NOVA SCOTIA, AND NEW BRUNSWICK.

| NAME. | SITUATION. | PHYSICAL FEATURES. | REMARKS. | TOWNS. |
|---|---|---|---|---|
| Newfoundland. | At entrance to G. of St. Lawrence. | Numerous rivers and lakes, hills, and valleys; the interior little known. | Climate severe; fogs prevail in May; soil barren; rich in minerals; fishing is the chief employment: seal-catching and cod-fishing. Has not yet joined Canadian Confederation. | *St. John's*, on the Avalon Peninsula; pop. 30,000; near it Trinity Bay, the terminus of the four Atlantic cables, which start from Valentia I. on S.W. of Ireland. |
| Nova Scotia. | Connected with New Brunswick by an isthmus sixteen miles across, and separated from Cape Breton I. by the Gut of Canso. | It is irregular in shape, being almost cut in two by the inlet of Bras d'Or. | Famed for coal mines; populatn. 400,000, engaged in agriculture, mining, and fisheries; one-half is good arable land; N.S. includes Cape Breton I. | *Halifax*, capital; *Sydney*, in Cape Breton I.; the former has one of the finest harbours in the world, and is the chief naval station of British North America. |
| New Brunswick. | N.W. of Nova Scotia, and E. of the U.S. | Generally flat or undulating; greater part covered with forests intersected by numerous rivers and lakes. | Much timber exported; shipbuilding extensively carried on; pop. 285,000, engaged in lumber trade, fishing, agriculture, and mining; coal abundant. | *Fredricton*, on St. John River, the capital; *St. John*, chief port; Bathurst; Newcastle; *Shediac*, a fishing town with rail into U.S. |

2. Trace the course of a voyage along the coast, from Cap Town to the mouth of the Tugela.

Leaving Cape Town we round the Cape of Good Hope, from which Cape Colony takes its name, navigate False Bay, and proceed south-easterly to C. Agulhas—or needles—the most southern extremity of Africa. The coast, which is now bold and rocky, runs eastward to Algoa Bay, on which capacious inlet stands Port Elizabeth. From Algoa Bay the coast runs N.E., and there is no inlet of any importance until reaching Port Natal, which is 1000 miles distant from Cape Town. After a short run we arrive at the mouth of the Tugela, which forms the boundary between Natal and Zululand.

3. Describe, as fully as you can, the situation and character of Adelaide, Melbourne, Sydney, Brisbane, Port Darwin, the Murray, the Australia Alps, and the Gulf of Carpentaria.

| NAME. | SITUATION. | CHARACTER. |
|---|---|---|
| Adelaide. | About four miles from the mouth of the Torrens River. | Well-built, thriving; pop. 50,000; rail and telegraphic communication with important places; capital of S. Australia. |
| Melbourne. | On the Yarra Yarra, about eight miles from Port Philip. | Streets wide, regular; fine parks, etc.; pop. 265,000; capital of Victoria. |
| Sydney. | On southern shore of Port Jackson. | Oldest town in Australia; handsome, with university, observatory, and royal mint; pop. 175,000; capital of New South Wales. |
| Brisbane. | On Brisbane R., near Moreton Bay. | Capital of Queensland; pop. 28,000. |
| Port Darwin. | On north coast of N. Australia, near Bathurst and Melville Is. | A settlement recently established; connected by telegraph with Singapore and Port Augusta, thus giving communication with Great Britain and Australia. |
| The Murray. | Forms the boundary between Victoria and N. S. Wales; flows west and south into L. Alexandrina. | Nearly 2,000 miles long; navigable for vessels of light draught for eight months of the year; navigation of its mouth extremely difficult; its tributaries, the Darling and Murrumbidgee, also navigable for part of the year. |
| Australian Alps. | Commence in latitude 35°, and run south through New S. Wales, enter Victoria, and extend W. to the Pyrenees. | Highest summit, Mt. Koscuisko, 7300 ft. In Victoria they form the watershed between the Murray and the streams flowing south. |
| Gulf of Carpentaria. | On north coast of Australia, between C. York and Point Dale. | Largest inlet on the Australian coast; shores low in general; Flinders R. enters the gulf. |

## SECOND PAPER.

*Two hours and a half allowed.*

## History.

1. Who was Dunstan? Mention the reigns during which he played a conspicuous part.

Dunstan was Archbishop of Canterbury in the tenth century. He maintained the contest of the spiritual against the secular power, and played a conspicuous part in the reigns of Edwy (955-959) and Edgar (959-975), ably managing the government for the latter.

2. How did Henry I. obtain the throne? Describe his character.

Henry, as soon as he heard of the death of his brother William (Rufus), galloped off to Winchester and seized the royal treasure, got the barons who were at hand to go through the form of an election, and two days later was crowned king, thus forestalling his brother Robert, who loitered on his way home from Palestine.

Henry I. was an able, firm, and energetic ruler, but at the same time oppressive and cruel. He was perfidious and profligate. His proficiency in learning gained for him the title of Beauclerc or "the fine scholar." His love and encouragement of learning must be commended as great and distinguished merits in the age in which he lived.

3. When did the English first invade Ireland? What was the pretext and what sanction was obtained.

Early in his reign, Henry II. had obtained authority from Pope Hadrian IV. to invade Ireland. Nothing was done till 1169, when Diarmid of Leinster was permitted to enlist adventurers to serve under him. The Earl of Pembroke and two gentlemen, Fitz-Stephen and Fitz-Gerald, accepted Diarmid's terms, raised on army, and at first carried everything before

them. On Diarmid's death, Strongbow, as Pembroke was surnamed, who had married Diarmid's daughter, assumed the royal authority; but eventually found it politic to invite Henry II. to come over as his Suzerain. Henry went over in 1171, and four years later a treaty was made acknowledging Henry as Liege lord of Ireland.

### Composition.

Write full notes of a lesson on *Money*.

THINGS TO BE SEEN AND HANDLED.—*Real coins (if possible)—farthing, halfpenny, penny; threepenny-piece, fourpenny-piece, sixpence, shilling, florin, half-crown, crown; half-sovereign, sovereign.*

WHAT MONEY IS.—Coins of metal, as gold, silver, copper, etc., of certain relative values; the coins made from the precious metals being of most value (*ask names of gold and of silver coins*): different names distinguish the coins (*ask children to examine the coins, read the inscriptions, and tell whose likeness is on them and why?*); the coin of least value is called a farthing, the most valuable a sovereign.

HOW AND WHERE MADE.—British money made chiefly in London at the *Mint* (*explain*). Sovereigns made of a mixture of gold and some alloy (*explain*)—to harden the metal as gold by itself is too soft. Metal melted in a crucible over a very hot fire; molten metal poured into moulds and stamped on each side—the one showing the face of the sovereign (*examine coins again*). Great quantities of silver and bronze coinage also made.

WHERE MONEY IS USED.—Throughout the whole civilized world—Europe, Asia, America, Australia; in some parts of Africa the substitutes for money are salt, cowries, or shell-money; and when there is no money a system of exchange is established called *barter* (*explain*).

USES.—For purchasing goods, paying labour, buying the necessaries and luxuries of life (*draw from the children as much as possible of their own knowledge of the use of money*).

### Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Ventidius*.

Write, in small hand, as a specimen of copy-setting, *Cæsar's sister is called Octavia.*

### Euclid.

MALES.

[All generally understood abbreviations for *words* may be used.]

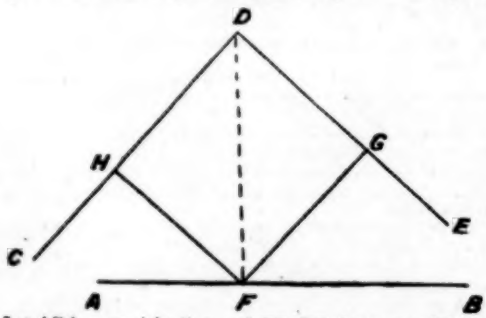
1. To draw a straight line at right angles to a given straight line, from a given point in the same.

Prop. 11, Bk. I.

2. Any two angles of the triangle PQR, are together less than two right angles.

Prop. 17, Bk. I.

3. In a given straight line to find a point such that the erpendiculars from it upon two given straight lines are equal.




Let AB be a straight line, and CD, ED the two straight lines upon which the equal perpendiculars are to be drawn.

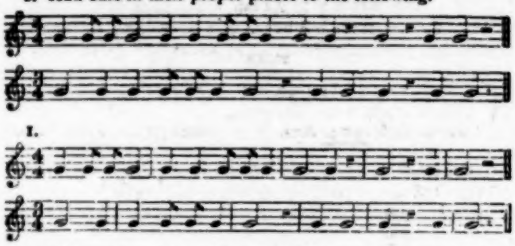
Let CD, ED be produced and meet in D; bisect the angle CDE by the straight line DF, which meets AB in F; from F draw FH, FG, perpendicular to CD, DE respectively.

Then because the angles HDF, GDF are equal, the angles at H and G right angles, and the side DF common to the two triangles HFD, GFD, then by I. 26 the triangles are equal in every respect, and therefore HF = FG. Q. E. F.

### Music.

*A quarter of an hour allowed for this paper.*

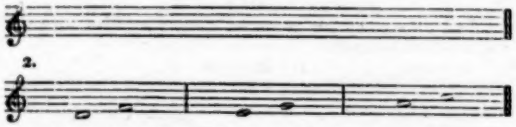
1. Add bars in their proper places to the following.



1.



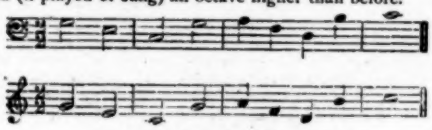
2. Write the *minor* thirds found between the notes of the scale of C (*Do*).



2.



3. Write the following in the treble stave, so that it would sound (if played or sung) an octave higher than before.



3.



## THIRD YEAR.

**Pupil Teachers at end of Third Year,** *if apprenticed on, or after,* **1st May, 1878; and Pupil Teachers at end of Fourth Year,** *if apprenticed before that date.*

*Three hours and a half allowed.*

### Arithmetic.

MALES.

1. If a draper buys 460 yards of cloth for £150, how should he sell it per yard to gain 15 per cent.?

100 : 115 :: £$\frac{115}{100}$ : selling price.

$\frac{£150 \times 115}{460 \times 100} = £\frac{3}{8} = \underline{7s.\ 6d.}$ Ans.

2. If by selling tea at 2s. 6d. per lb. a grocer loses 4 per cent., at what price ought he to sell it to gain 8 per cent.?

96 : 108 :: 30d. : price required.

$\frac{30d. \times 108}{96} = \underline{2s.\ 9\frac{3}{4}d.}$ Ans.

3. Which is the more profitable, to invest money in the 3 per cents. at 97$\frac{1}{2}$, or in the 4 per cent. railway debentures at 131? What would be the difference in income derived from investing £8515 in each?

Income per £ from 1st investment = $\frac{3}{97\frac{1}{2}} = \frac{300}{8515}$

" " " 2nd " = $\frac{4}{131} = \frac{260}{8515}$

difference per £ in favour of 1st = $\frac{40}{8515}$

difference of income from investing £8515 = £$\frac{8515 \times 2}{8515}$

= £2. Ans.

4. If a person invests £1300 in 4 per cent. railway preference shares at 104, what would be his loss of property if the shares fell 1$\frac{1}{2}$?

£104 : £1300 :: £1$\frac{1}{2}$ : loss.

£$\frac{11 \times 1300}{8 \times 104}$ = £$\frac{275}{16}$ = £17 3s. 9d. Ans.

5. Find true discount on a bill of £1249 10s. drawn Feb. 4th for six months and discounted March 11th at 5 per cent. per ann.

Bill is due on 7th August, reckoning 3 days of grace.

∴ from March 11th till August 7th, the bill has 149 days to run

(1st) Interest on £100 for 149 days at 5 p.c. = £$\frac{745}{73}$ = £2$\frac{19}{73}$

Amount of " " " " " = £102$\frac{19}{73}$

∴ £102$\frac{19}{73}$ : £2$\frac{19}{73}$ :: £1249$\frac{1}{2}$ : discount.

£$\frac{2499 \times 149}{2 \times 7449}$ = £$\frac{372351}{14898}$ = £24 19s. 11$\frac{6}{1489}$d. nearly £25.

(2nd)

Not reckoning the days of grace, the bill has 146 days to run.
Interest on £100 for 146 days at 5 p.c. = £2.
∴ 102 : 2 :: £1249 10s. : £24 10s.
True discount if the bill be payable on demand.

FEMALES.

1. Divide 28·3696 by 1·49, and 27 by ·00225.

| 1st. | 2nd. |
|---|---|
| 1·49)28·3696(19·04. Ans. | ·00225)270(12000. Ans. |
| 149 | 225 |
| 1346 | 450 |
| 1341 | 450 |
| 596 | |
| 596 | |

2. Express £2 13s. 4½d. as the decimal of 12½ guineas.

$$\frac{£2\ 13s.\ 4\tfrac{1}{2}d.}{12\tfrac{1}{2}\ guis.} = \frac{53·375s.}{262·5s.} = ·20\dot{3}. \quad Ans.$$

3. How long would it take to travel 30·2375 miles at the rate of 8·85 miles per hour.

$$No.\ hours = \frac{30·2375\ miles}{8·85} = 3·416\ hours.$$
$$= 3\ hrs.\ 25\ mins. \quad Ans.$$

4. Reduce 4·22428571 to a vulgar fraction.
4·22428571 = 4.22$\frac{2}{7}$ = 4$\frac{11}{50}$. Ans.

## Grammar.

1. 'Patience, *be* near me still; and set me lower;
I have not *long* to trouble thee. Good Griffiths
*Cause* the musicians *play* me that sad note
I named my *knell*, *whilst* I sit *meditating*
On that celestial harmony I go *to*.' SHAKESPEARE.

(*a*) Analyse the last three lines, supplying any words which seem to be needed to make the analysis complete.
(*b*) Parse the words underlined.
(*c*) Paraphrase the last three lines.

(*a*)

| Sentence. | Kind. | Subject. | Predicate. | Object or Completion. | Extension. | Connective. |
|---|---|---|---|---|---|---|
| (1) Cause the musicians (to) play (for) me that sad note. | Principal | (thou) | cause | the musicians (to) play (for) me that sad note. (*Complement.*) | ,, | |
| (2) (Which) I named my knell. | subord. adj. to 'note' | I | named | (*which*) my knell. (*Complement.*) | ,, | |
| (3) Whilst I sit meditating on that celestial harmony. | Subord. adv. to 'play' | I | sit | meditating on that celestial harmony. (*Complement.*) | | whilst |
| (4) (Which) I go to. | Subord. adj. to 'harmony' | I | go | ,, | to (which) *place* | |

(*b*) *be*—irreg. intrans. verb, *am*, *was*, *been*, imper. pres. indef., 2nd per., sing., agr. with subj. (thou).
*long*—adj., qual. (time), used here as adverb, modifying the phrase 'have to trouble.'
*cause*—reg. trans. verb, imper. pres. indef., 2nd pers., sing., agr. with ('thou').
*play*—reg. trans. verb, infin., pres., indef., gov. by 'cause.'
*knell*—abstr. noun, neut., sing., obj. agr. with, or in app. with 'which.'
*whilst*—subord. temporal cong. adv., mod. 'sit,' and introducing subord. sent.
*meditating*—reg. intrans. verb, incomplete part., qual. 'I.'
*to*—prep., gov. ('which'), relating 'go' to 'which.'

(*c*) Play once more that melancholy strain which I thought so like my funeral knell, while I try to form some idea of the music which I shall soon enjoy in heaven.

2. Give the Latin prepositions which mean *above*, *under* *across*, in *front* of, and point out how some of them are changed in composition.

| English. | Latin. | In Composition. | Examples. |
|---|---|---|---|
| above | super | sur | *super*-incumbent, *sur*face. |
| under | sub | suc, suf, sug, sum, sup, sur, sus | *sub*tract, *suc*ceed, *suf*fer, *sug*gest, *sum*mit, *sup*pose, *sur*rogate, *sus*pend. |
| across | trans | tran, tra | *trans*act, *tran*quil, *tra*ject. |
| in front of | pre (præ) | | *pre*cede, *pre*fix. |

## Geography.

*Answer either* Q. 2 *or* Q. 3; *not both*.

1. Draw a full map of the coast-line from Behring's Straits to the Straits of Malacca, with the adjacent islands.

Insert the lines of latitude and longtitude.

2. Give notes of a lesson on Arabia and the Arabs.

ARABIA AND THE ARABS.

*Boundaries.*—N., Syria and the Euphrates; E., Persian Gulf; S., Indian Ocean; W., Red Sea and Isthmus of Suez.
*Length.*—1600 miles. *Breadth.*—1000 miles. *Population.*—10,000,000.
*General Aspect.*—Surface, an immense plateau, skirted along W. and S. by mountain chains—Horeb and Sinai, in peninsula of Sinai, greatest heights—coasts low, and fertile where well-watered—interior, immense shifting sands—no rivers, except in the rainy season.
*Climate.*—One of the driest in the world—heat of plains excessive—temperate in highlands—simoom blows from interior to coasts.
*Productions.*—*Vegetables*, date, palm, coffee, cotton, spices, vines, fig, etc. *Animals*, horse and camel most important, as they form the chief wealth of the Arabs. All kinds of industry unimportant, but large quantities of merchandise brought by sea and caravans.
*Chief Towns.*—*Mecca*—'Holy City,' birth-place of Mahomet; *Medina*—where Mahomet is buried; *Mocha*—famed for its fine coffee; *Aden*—strongly fortified (British); *Muscat*—great emporium of commerce.
*Arabs.*—People of two classes—those settled in towns, and Bedouins, or children of the desert—supposed to be descended from Ishmael—wander with flocks and herds—dwell in tents, and live partly by plunder—Government is vested in the Bedouin chief, styled *Sheikh* or *Emir*.

3. Name in order the capes on the coast of Africa.

The capes on the coast of Africa in order are:—*Bonn* and *Ras-al-Krun*, N. of Tunis; *Spartel*, N. of Morocco; *Cantin* and *Nun*, W. of Morocco; *Bojador* and *Blanco*, W. of the Sahara;

*Verd* and *Roxo*, W. of Senegambia; *Palmas*, *Three Points*, and *Formosa*, S. of Upper Guinea; *Lopez* and *Negro*, W. of Lower Guinea; *Good Hope* and *Agulhas*, S. of Cape Colony; *Corrientes*, E. of Sofala; *Delgado*, N.E. of Mozambique; and *Guardafui*, the most eastern point of Africa.

## SECOND PAPER.

*Two hours and a half allowed.*

### History.

1. What change in ecclesiastical organisation was made by Henry VIII.? What induced him to make it?

Henry VIII. by the advice of his minister Cromwell, threw off his allegiance to Rome, and declared himself *supreme head of the Church of England*, which title was confirmed by the Parliament of 1534. Following up his desire to deal a terrible blow at the Papal power, and at the same time to enrich himself, he obtained the sanction of Parliament to suppress the monasteries. By this policy the king was enriched with a yearly income of £161,000.

This change was made in order that Henry might be divorced from Queen Catherine, and be married to Anne Boleyn. The Pope would upon no account sanction the divorce, so Henry resolved to set the Pope's authority aside and be head of the Church himself.

2. What opposition was raised to the accession of Mary Tudor? What was the end of that opposition?

Before the death of Edward VI., Northumberland persuaded that prince to overlook the claims of Mary and Elizabeth, daughters of Henry VIII., and leave the Crown to Lady Jane Grey, daughter of the Duchess of Suffolk. The king's affection for Protestantism inclined him to this settlement. This arrangement was advocated by Northumberland to satisfy his own ambition, seeing that he had married his son Guildford Dudley to the Lady Jane.

When Edward died, Jane Grey was proclaimed; but the feeling of the people leaned towards Mary, and her supporters increased, while those of her opponent diminished. Northumberland, Suffolk, Guildford Dudley, and Lady Jane were arrested. Northumberland was executed, but the others were spared for some time.

3. Give the names and parentage of the two princes known as the Old Pretender and the Young Pretender. What great efforts were made in their favour?

Genealogical Table showing the parentage of the Old and the Young Pretender:—

James II. M. Mary of Modena (his second wife)

James Stuart (the Old Pretender) M. Clementina Sobieski

Charles Edward (the Young Pretender) — Henry Benedict The last of the Stuarts.

The first great effort in favour of the Old Pretender was made in the Rebellion of 1715, or Mar's Rebellion; and the second, in favour of Charles Edward, was made in the Rebellion of 1745—called the '45, as the first is called the '15.

### Composition.

Write from memory the substance of the passage read to you by the Inspector.

In the early months of the present year, a French peasant, wearing a blouse and head-dress like the Scotch bonnet, began to drive a flock of goats up Long Acre, diverging into the courts and alleys off Bow Street and Drury Lane. He spoke no English, and even his French was a dialect; yet he contrived to make it understood that his business was to sell pennyworths of goats'-milk to any one who cared to buy. In a short time he had instituted a regular milk-walk. The news of his prosperity travelled all the way to the goat-farms of the Pyrenees, and in a short time he had three rivals, who, probably having no conception of the vast extent of London, competed with him on his own ground. Goats'-milk became a drug in the market. The rival dealers, after a period of cut-throat competition, went home again, leaving the original goats'-milk merchant to enjoy their discomfiture. With his six large goats he every morning makes the tour of his district, and prospers.

## Euclid.

MALES.

[All generally understood abbreviations for *words* may be used.]

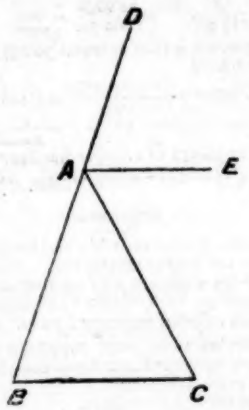
Answer two questions, including question 2, if possible.

1. If a straight line falling upon two other straight lines, make the exterior angle equal to the interior and opposite upon the same side of the line; or make the interior angles upon the same side together equal to two right angles; the two straight lines shall be parallel to one another.

Prop. 28, Book I.

2. If the straight line bisecting the exterior angle of a triangle be parallel to the base, the triangle is isosceles.

Prop. 34, Book I.




Let the straight AE which bisects the exterior angle DAC of the triangle ABC be parallel to the base BC; then ABC is isosceles.

Because AE is parallel to BC the exterior angle DAE = the interior and opposite angle ABC and the alternate angles EAC, ACB are also equal. But the angles EAD, EAC are equal.

Wherefore the angles ABC, ACB must be equal; and hence the triangle ACB is isosceles.

3. The opposite sides and angles of the parallelogram LMNR are equal to one another, and the diameter MR bisects it, that is, divides it into two equal parts.

Prop. 34, Book I.

## Algebra.

MALES.

Answer two questions, including question 2, if possible.

1. Show that $a^2x^2 + b^2y^2 - c^2z^2 + 2abxy = (ax + by + cz)(ax + by - cz)$, and prove it when $a=1$, $b=2$, $c=3$, $x=\frac{1}{2}$, $y=\frac{1}{3}$, $z=\frac{1}{4}$.

$$(ax+by+cz)(ax+by-cz) = \{(ax+by)+cz\}\{(ax+by)-cz\}$$
$$= (ax+by)^2 - (cz)^2$$
$$= a^2x^2 + b^2y^2 - c^2z^2 + 2abxy$$

Q. E. D.

*Proof.*

$$a^2x^2 + b^2y^2 - c^2x^2 + 2abxy = (ax+by+cz)(ax+by-cz)$$
$$(1\times\tfrac{1}{2}) + (4\times\tfrac{1}{3}) - (9\times\tfrac{1}{16}) + 2(2\times\tfrac{1}{2}\times\tfrac{1}{3}) = (1\times\tfrac{1}{2} + 2\times\tfrac{1}{3} + 3\times\tfrac{1}{4})(1\times\tfrac{1}{2} + 2\times\tfrac{1}{3} - 3\times\tfrac{1}{4})$$
$$\tfrac{1}{2} + \tfrac{4}{3} - \tfrac{9}{16} + \tfrac{2}{3} = (\tfrac{1}{2} + \tfrac{2}{3} + \tfrac{3}{4})(\tfrac{1}{2} + \tfrac{2}{3} - \tfrac{3}{4})$$
$$\frac{36+64-81+96}{144} = \left(\frac{6+8+9}{12}\right)\left(\frac{6+8-9}{12}\right)$$
$$\tfrac{11}{144}\tfrac{5}{144} = \tfrac{23}{12}\times\tfrac{5}{12} = \tfrac{11}{144}\tfrac{5}{144}.$$

Q. E. D.

2. *Prove* that $a^{2m} \div a^{2n} = a^m$, where $a$, $m$ represent any integers.

Divide $\frac{1}{1+x} + \frac{x}{1-x}$ by $\frac{1}{1-x} - \frac{x}{1+2}$

2. (*a*) *One power of any number is divided by another power of the same number by subtracting the index of the latter power from the index of the former.*

Thus $a^5 \div a^3 = a \times a \times a \times a \times a \div a \times a \times a = a^2 = a^{5-3}$

Any other case may be established in a similar manner.

Hence, if $3m$ and $2m$ be any whole numbers, we have $a^{3m} \div a^{2m} = a^{3m-2m} = a^m$.

(*b*) $$\frac{\frac{1}{1+x}+\frac{x}{1-x}}{\frac{1}{1-x}-\frac{x}{1+x}} = \frac{\frac{1-x+x+x^2}{1-x^2}}{\frac{1+x-x+x^2}{1-x^2}} = 1$$ Ans.

2. Solve the equations :—

(1) $$\frac{(m+n)(n-x)}{m-n}+x=0$$

(2) $$9-\frac{2x-3}{2x-2}=\frac{5x+3}{x-1}$$

(1) $$\frac{(m+n)(n-x)}{m-n}+x=o=mn+n^2-mx-nx+mx-nx$$

$$2nx=mn+n^2$$

$$x=\frac{m+n}{2}$$ Ans.

(2) $$9-\frac{2x-3}{2x-2}=\frac{5x+3}{x-1}$$

Clearing of fractions $18x-18-2x+3=10x+6$

$$18x-2x-10x=6+18-3$$

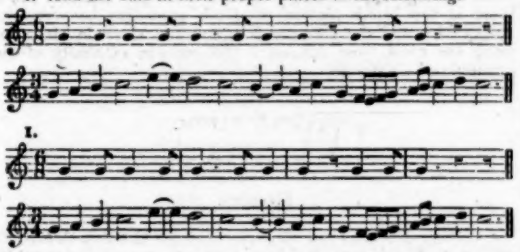
$$6x=21$$

$$x=3\tfrac{1}{2}$$ Ans.

## Music.

*A quarter of an hour allowed for this paper.*

1. Add the bars in their proper places to the following.

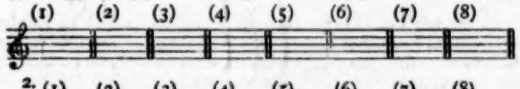


1.

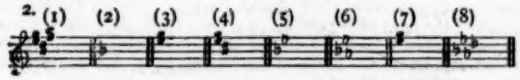


2. Write the key-signatures of the keys of (1) A, (2) F, (3) G, (4) D, (5) B♭, (6) C minor, (7) E minor, (8) F minor.

(1) (2) (3) (4) (5) (6) (7) (8)



2. (1) (2) (3) (4) (5) (6) (7) (8)



3. Write under each of the following intervals its name (minor sixth, and so on).

3.

Minor 6th. Perfect 5th. Plup. 4th. Major 6th. Aug. 2nd. Major 7th.

# FOURTH YEAR.

**Pupil Teachers at end of Fourth Year,** *if apprenticed on, or after,* 1st *May,* 1878; **and Pupil Teachers at end of Fifth Year,** *if apprenticed before that date.*

*Three hours and a half allowed.*

## Arithmetic.

### MALES.

1. How much money should be invested in the 3 per cents., at 97½, to produce the same income as £2394 in railway stock, at 126, paying a dividend of 4 per cent.?

(*a*) £126 : £2394 :: £4 : income from £2394

$$\frac{£4 \times 2394}{126} = £76$$

(*b*) £3 : £76 :: £97½ : money to be invested

$$\frac{£97\tfrac{1}{2} \times 76}{3} = £2,470.$$ Ans.

2. An army lost 15 per cent. by disease, and 13 per cent. of the remainder in battle, and there were 29,580 left; of how many men did the army consist at first?

A loss of 15 p.c. leaves $\frac{85}{100}$ of the whole

A loss of 13 p.c. of $\frac{85}{100}$ leaves $\frac{87}{100}$ of $\frac{85}{100}$

∴ the army consisted of $\frac{29,580 \times 100 \times 100}{87 \times 85} = \frac{295,800,000}{7395}$

$$= 40,000$$ men. Ans.

3. A person left ⅞ of his property to his son, 12½ per cent. to his daughter, and the remainder, which was £150, to his niece; what was the property worth?

(*a*) 12½ p.c. $= \frac{12\frac{1}{2}}{100} = \frac{1}{8}$

(*b*) $\frac{1}{8} + \frac{7}{8} = \frac{8}{8}$; ∴ the rem. $= \frac{1}{8}$

(*c*) The whole property therefore $= £\frac{150 \times 40}{3} = £2,000.$ Ans.

4. A man had 42 coins, consisting of half-sovereigns and half-crowns, in his purse, and the sums of money in half-sovereigns and half-crowns were as 8 : 5; how many coins of each sort had he?

Ratio of value of coins 8 : 5; but half-sov. : half-cr. as 4 : 1

∴ the ratio of numbers of each coin is 8 : 20

28 : 8 :: 42 : 12 half-sovs. Ans.

28 : 20 :: 42 : 30 half-crs. Ans.

5. For what sum should a ship, worth £7,250, be insured at £3 6s. 8d. per cent., so that the owner might recover, in the case of loss, the value of the ship and insurance?

Here, if £100 were insured, it would cover goods to the amount of £96⅔, together with the premium 3⅓; hence we have this proportion, £96⅔ : £7250 : £100 : amount.

$$\frac{£100 \times 7250 \times 3}{290} = £7,500.$$ Ans.

### FEMALES.

1. What principal will, in three years, at 6½ per cent., produce £63 interest?

£100 in 3 yrs. at 6½ p.c., produces £18¾

∴ £18¾ : £63 :: £100 : principal

$$\frac{£100 \times 63 \times 4}{75} = £336.$$ Ans.

2. Divide £38 8s. between A, B, C, so that B may have two-thirds as much again as A, and C three-fifths of A and B together.

Suppose A gets 15 shares

then B ,, 25 ,,

and C ,, 24 ,,

Total 64

| | £ | s. | |
|---|---|---|---|
| A's = 15/64 of £38 8s. = | 9 | 0. | Ans. |
| B's = 25/64 ,, = | 15 | 0. | Ans. |
| C's = 24/64 ,, = | 14 | 8. | Ans. |

3. If 12 bricklayers can build 90 yards of wall in 8 days, how many must be employed to build 210 yards in 14 days?

90 yards : 210 yards
14 days : 8 days
:: 12 bricklayers : ?

$$\frac{12 \text{ bricklayers} \times 210 \times 8}{90 \times 14} = 16 \text{ bricklayers.}$$ Ans.

## Grammar.

1. 'No, in good *sooth;* the fire is *dead* with grief,
*Being create* for *comfort, to be us'd*
In undeserved extremes: *See else yourself;*
There is no malice in this burning coal;
The breath of Heaven hath *blown* his spirit *out,*
And strewed repentant ashes on his head.'

SHAKESPEARE. '*King John.*'

(*a*) Under what heads may enlargements of the subject be classified? Assign each of the enlargements in the above to its proper class.

*(b)* Parse the words underlined.
*(c)* Paraphrase the last three lines, expressing the metaphors in prose language.

*(a)* Enlargements of the subject may be classified under the following headings:—
(1) An adjective. (2) A participle or participial phrase. (3) A noun in apposition. (4) A noun in the possessive. (5) A phrase beginning with a preposition. (6) An adjective clause. (7) An infinitive phrase.
'Being create for comfort' falls under No. 2;
'Of heaven' " " " " 5.
*(b)* *No*—negative adv. = a sentence.
*sooth*—abstr. noun, neut., sing., obj., gov. by 'in.' It is usual to take 'in good sooth' as an adv. phrase.
*dead*—predic. adj., qual. 'fire.'
*being*—incomplete part. of the irreg intrans. v. *am*, was, *been*, forming with
*create* (for *created*)—(complete part of reg. v. create), pres. part., pass., qual. 'fire.'
*comfort*—abstr. noun, neut., sing., obj. gov. by 'for.'
*to be*—pres. inf. of *am*, *was*, *been*.
*to be used*—pres. in., pass. of the reg. verb 'use.'
*see*—irreg. intrans. verb, *see*, *saw*, *seen*, imper., pres. agr. with (thou).
*else*—adv., mod. 'see.'
*yourself*—compound pers. pron., 2nd pers., sing., nom. in app. with (you).
*blown*—complete part of the irreg. trans. verb, *blow*, *blew*, *blown*.
*out*—adv., mod. blown—'out' is here a separable part of the verb 'to blow out.'
*(c)* There is nothing to harm us in this fire, for the wind has extinguished it; and like a man who, grieving for his evil deeds, clothes himself in the garb of repentance, it is left covered with dust and ashes.

2. In what respects does Old English mainly differ from the language now spoken in this country?

Old English differed from modern English in this respect, that it had a greater number of grammatical inflexions, that is, it made more changes in the words themselves to express changes of meaning. Thus nouns had five cases and different declensions; adjectives were declined, and had three genders; pronouns had more forms; and verbs had a greater variety of personal terminations. Modern English has dropped the greater part of these inflexions, and in their place are used prepositions and auxiliary verbs. The above explains what is meant when people say that ancient English was a more 'inflexional' language than modern English.

## Geography.

1 Give notes of a lesson on 'The Indian Ocean.' Illustrate by a map, and insert the lines of latitude and longitude.

Notes on 'THE INDIAN OCEAN.'

I. BOUNDARIES AND EXTENT.—Separated from the Pacific by Australia and the Asiatic Archipelago, and from the Atlantic by Africa; much smaller than either Pacific or Atlantic; it is a double bay, forcing itself up into the land, bounded on the W. by Africa, on the E. by Malaysia and Australia, and on the N. by Asia; its southern boundary is an imaginary line drawn from C. Agulhas to C. Leeuwin; shaped like an equilateral triangle, the apex of which is intersected by the huge wedge-like promontory of Hindostan; it is estimated to cover 29,000,000 of square miles; its extreme breadth being upwards of 6000 miles.

II. PARTS.—It pushes into the Asiatic Continent by the two smaller bays of Arabia and Bengal; and still further, by the long narrow inlets of the Persian Gulf and Red Sea; Gulfs of Cambay and Cutch are parts of Arabian Sea, as also G. of Oman, joined to the Persian Gulf by Str. of Ormuz; G. of Aden is joined to the Red Sea by the Str. of Babel-mandeb; Delagoa Bay is the only one of importance on African Coast; Str. of Malacca open into the China Sea; Str. of Sunda into Java Sea; Str. of Macassar into Pacific; Palk's Passage is between Ceylon and India; and Channel of Mozambique between Madagascar and Africa.

III. ISLANDS.—Madagascar, off coast of Africa, Bourbon, Mauritius, Rodriguez, Amiranté, Seychelles, Comoro; Zanzibar and Socotra; Chagos, Maldives, Laccadives; Ceylon, Andaman, Nicobar, and Mergui Islands; Sumatra, and others of the E. Indies.

IV. RIVER SYSTEMS.—*African section*—Zambesi, Limpopo. *Asiatic section*—Euphrates and Tigris, Indus, Nerbudda, etc., in Western India; Ganges, Brahmapootra, Irrawady, and many others falling into the Bay of Bengal; *Australian section*—Rivers of Australia.

V. CHARACTERISTIC NOTES.—Contains many coral reefs. Its most striking feature lies in its periodical winds, called *Monsoons*, which take the place of the trade-winds of the Atlantic and Pacific, are of great value to navigation, and have a great effect on the climate of India; a great *ocean current* starts from the Bay of Bengal, sweeps past Ceylon, and the Seychelles Is., and between Africa and Madagascar, to the Cape of Good Hope, where it is suddenly checked and turned back to the S.W.; it is exposed to sudden tempests, called *tornadoes*, and to *cyclone* waves.

2. Describe fully the Rocky Mountains and the country between them and the Pacific Ocean.

The Rocky Mts., the chief range in North America, extend from the shores of the Arctic Ocean as far south as the 30th parallel. In the extreme north, these mountains are not more than 1000 or 2000 feet in elevation; but the chain rapidly increases in height as we follow it southwards, until it reaches an average of 7000 feet. Mt. Brown, in British America, 15,910 feet, is the highest summit in the whole chain; Mount Hooker and Mount Murchison are not much less in height. In the United States the highest summits are Fremont's Peak and Long's Peak, both of which reach an elevation of 13,500 feet.

Between the Rocky Mountains and the Pacific there is a broad belt of high land, crossed by numerous mountain ranges. In the extreme north we have the extensive valley of the Youcon. In British Columbia the land descends by terraces to the sea, each terrace being supported by a mountain range. Further south there is the broad plateau of Utah extending between the Rocky Mts. and the Cascade Range. The Cascade Mts. run along the coast, from Alaska to the southern extremity of the peninsula of California.

## SECOND PAPER.

*Two hours and a half allowed.*

## History.

1. When and how did England lose her thirteen American colonies? Would you consider the consequences of that event to be beneficial, or otherwise, to this country and to the human race?

In the reign of George III., Mr. Grenville passed an Act by which legal and other papers were to be stamped and used in the Colonies. Although this Stamp Act was repealed, on account of the firm opposition of the Colonists, yet the English Parliament asserted the right of the Crown to tax the Colonies, even without representation. This led to the War of Independence, which commenced with the Battle of Lexington, 1775, and ended with the capitulation of Yorktown in 1781.

Peace was made in 1783, when Great Britain acknowledged each of the thirteen Colonies to be a free, sovereign, and independent republic.

The effect on this country, and, in fact, on the whole human race, has been most beneficial, both socially and politically. America became a home for the oppressed and poor of the Old World. Her example inflamed the French in their Revolution; patriotism was stimulated; government by the people more thoroughly understood; despotism on this side of the Atlantic mightily shaken; and freedom of thought and action encouraged. America, it has been said, has asserted and proved to the world that it is safe and wise to trust the people.

2. What produced the Cotton Famine of 1862? What were its effects in this country, and how was it brought to an end?

From 1861 to 1864, the Civil War in America, causing a continuous blockade of the cotton-growing Southern States of the Union, produced in England the distress known as the Cotton Famine. The mills of Lancashire, for want of raw cotton, stopped working, and thousands of workmen and their families were brought to destitution. Public subscriptions and State aid relieved them, and the time of suffering was passed through with exemplary patience by the working classes.

3. Give names and dates of Prime Ministers who have died a violent death while in office, and sketch the character and policy of one of them.

Mr. Perceval was assassinated in 1812 by Bellingham, and Sir Robert Peel was killed by a fall from his horse in May, 1850.

Peel's policy is best known in connection with Free-trade. In 1845 he entered Parliament, pledged to support the oppressive Corn Laws. He, however, saw that the scarcity of food during that year required immediate action. Summoning his Cabinet, he declared that he could not incur the guilt of maintaining laws which, in a few weeks, must inflict the horrors of famine upon the people. The proposition to repeal the obnoxious law was too much for his colleagues, and he therefore resigned office. The country restored him to office again; and, surrounding himself with men favourable to his desires, the Corn Laws were repealed. When leaving office, after speaking of the hostility which he had roused among defeated monopolists, he said:—'It may be that I shall be sometimes remembered with expressions of good-will in the abodes of those whose lot it is to labour and earn their daily bread by the sweat of their brow.' His policy at that time delivered the country from laws which were undermining its greatness and leading it to ruin.

### Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Ventidius*.

Write, in small hand, as a specimen of copy-setting, *Cæsar's sister is called Octavia.*

### Composition.

Write a short essay on *Mountains.*

Those bold eminences on the earth's surface, called 'Mountains,' form the most imposing aspects of Nature. They are to the painter the most picturesque, and to the geologist the most interesting of all natural objects. They appear under the various forms of gentle slopes, bold hills, and majestic heights, rising above the clouds, and appearing to claim sovereignty over the surrounding country in which they are situated.

Mountains may be single and independent, like Etna or Vesuvius, and then they are generally volcanoes; or they may be connected in one long range or chain, or cordillera, like the Pyrenees, or the Appenines, and the Caucasus; or in two parallel ridges, or even more, with great valleys and table-lands, and smaller mountains between them, like the Andes and the Rocky Mountains, between the ranges of which lie great countries like Mexico, and Peru, and Oregon. They may even be collected together, with no very obvious arrangement, like the Alps.

The highest mountains in the world are the Himalayas, where there are three peaks rising over 28,000 feet, and many others nearly as high. In the Andes there are seven mountains which vary from 25,000 to 15,000 feet. Mount Blanc, the highest mountain in Europe, is 15,784; Ben Nevis, 4,406; and Snowdon, 3,590 feet.

As we ascend a mountain, the heat of the air becomes less, until it grows so cold that the snow remains there always, which height is called the *snow-line.* The height at which this takes place varies in different parts of the world, and depends on various circumstances, as, for instance, whether the mountain faces south or north, whether it is steep or not, whether it is exposed to warm winds or cold winds. Warm winds contain a great deal of moisture, and when such a wind blows on a cold mountain-side it drops moisture, which means that rain falls.

We who live in Europe can form little idea of what a frightful calamity there is in the want of mountains and streams. Australia suffers from such a want, and is very likely to suffer till the end of time.

Mountains have played a great part in the history of many countries by affording a refuge for the people when the lower countries were conquered, and preserving for long the names, manners, and customs of the first inhabitants of the country, as, for example, Wales, the Highlands of Scotland, Switzerland, and others. Mountains, rather than rivers, are the natural barriers between countries. But for the Cheviot Hills, England and Scotland would have been earlier united; but for the Highlands, the Saxon and the Gael would have been one; and it has been well remarked that the Vosges mountains, and not the Rhine, were the real division between France and Germany, as shown by the War of 1870.

### Euclid.

[All generally understood abbreviations for *words* may be used.]

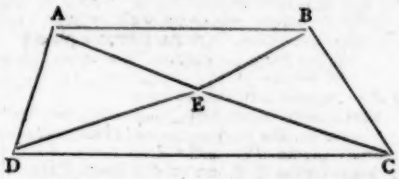
*Answer two questions, including Question 2, if possible.*

1. Parallelograms upon equal bases and between the same parallels are equal to one another.

Prop. 36, Bk. I.

2. A quadrilateral is divided by its diagonals into four triangles, of which two opposite ones are equal. Show that two sides of the quadrilateral are parallel.

Let the quadrilateral ABCD be divided into the four triangles ABC, BCE, CED, DEA, of which the two BCE, DEA are equal; then AB shall be parallel to CD.




To each of the equal triangles add CED, then the whole ACD = the whole BDC, and these triangles are upon the same base; therefore they must be between the same parallels. Wherefore AB is parallel to DC. Q.E.D.

3. If a straight line be divided into any two parts, the square on the whole line is equal to the squares on the two parts, together with twice the rectangle contained by the parts.

Prop. 4, Bk. II.

### Algebra.

MALES.

*Answer two questions, including Question 2, if possible.*

1. Simplify:—

$$\frac{a}{(a-b)(a-c)}-\frac{b}{(b-c)(b-a)}-\frac{c}{(c-a)(c-b)}$$

In the 2nd and 3rd expressions multiply the terms by $-1$, then the expressions stand thus—

$$\frac{a}{(a-b)(a-c)}-\frac{-b}{(b-c)(a-b)}-\frac{-c}{(c-a)(b-c)}$$

Again, multiply the terms of the 3rd expression by $-1$, and the result is—

$$\frac{a}{(a-b)(a-c)}+\frac{b}{(b-c)(a-b)}-\frac{c}{(a-c)(b-c)}$$

L.C.D. of denominators $=(a-b)(a-c)(b-c)$

$$\frac{a(b-c)+b(a-c)-c(a-b)}{(a-b)(a-c)(b-c)}=\frac{ab-ac+ab-bc-ac+bc}{(a-b)(a-c)(b-c)}$$

$$=\frac{2a(b-c)}{(a-b)(a-c)(b-c)}$$

$$=\underline{\frac{2a}{(a-b)(a-c)}}\quad\text{Ans.}$$

2. Prove that in the quadratic equation, $x^2-px+q=0$, the sum of the roots is $p$.

Let the roots of $x$ be found as usual.

$$x^2-px+q=0$$

$$x^2-px=-q$$

Completing square $x^2-px+\frac{1}{4}p^2=\frac{1}{4}p^2-q$

Taking root $x-\frac{1}{2}p=\pm\sqrt{\frac{1}{4}p^2-q}$

$\therefore$ the one root $=\frac{1}{2}p+\sqrt{\frac{1}{4}p^2-q}$

and the other $=\underline{\frac{1}{2}p-\sqrt{\frac{1}{4}p^2-q}}$

therefore their sum is $\underline{p}$. Q.E.D.

3. Solve the equations:—

1. $\begin{cases}7(x-1)=6y\\99x-89y=12\end{cases}$

2. $(x+a-b)^2-5a(x+a-b)=-6a^2$

1. $7x-7=6y$ or $x=\frac{6y+7}{7}$

$$99x-89y=12$$

Substituting for $x$ in the 2nd $\frac{594y+693}{7}-89y=12$

$$594y+693-623y=84$$

$$29y=609$$

$$\underline{y=21}.\quad\text{Ans.}$$

Hence $\underline{x=19}$. Ans.

2. $(x+a-b)^2 - 5a(x+a-b) = -6a^2$

Completing sq. $(x+a-b)^2 - 5a(x+a-b) + \frac{25a^2}{4} = \frac{25a^2 - 24a^2}{4} = \frac{a^2}{4}$

taking root $(x+a-b) - \frac{5a}{2} = \pm\frac{a}{2}$

$$x = \frac{5a - 2a + 2b}{2} \pm \frac{a}{2}$$

$x = a+b$ or $2a+b$. Ans.

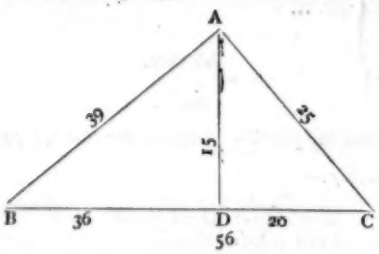
## Mensuration.

MALES.

1. Find the area of the circle whose diameter is the hypotenuse of the right-angled triangle whose sides are 370 and 168 feet.

Here Square of Diameter or Hyp $= 370^2 + 168^2$
$= 165,124$
Now the area of a circle = sq. of diameter $\times$ ·7854
∴ Area of circle = $165124 \times ·7854$
$= 129688.3896$ sq. ft. Ans.

2. The sides of a triangle are 56, 25, and 39 feet: compare the areas of the two triangles into which it is divided by the perpendicular from the angle opposite the largest side on that side.



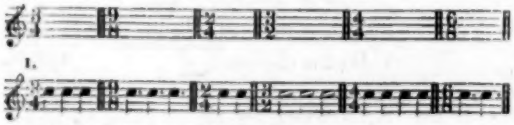

Area of ABC $= \sqrt{60 \times 35 \times 21 \times 4}$
$= \sqrt{176,400}$
$= 420$ sq. ft.
$= \frac{Base \times AD\ (perp.\ height)}{2}$

∴ Area $\times 2$ = Base $\times$ AD
$56^2$ = AD = 15 ft.
Again $AC^2 - AD^2 = DC^2$
$25^2 - 15^2 = DC^2$
$625 - 225 = DC^2$
20 = DC.
Hence $56 - 20 = 36$ = BD.
Area of ABD $= \frac{36 \times 15}{2} = 270$ sq. ft.
Area of ADC $= \frac{20 \times 15}{2} = 150$ "
Area of ABD : Area of ADC as 270 : 150 or as 9 : 5. Ans.

## Music.

*A quarter of an hour allowed for this paper.*

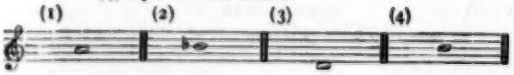
1. Fill up the following measures with notes equal to their proper contents.



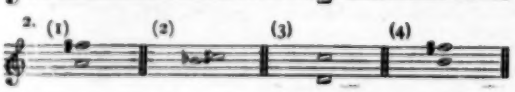
1.



2. Write (1) a major sixth from A.
(2) an augmented second from B♭.
(3) a minor seventh from D.
(4) a perfect fifth from B.




2.




3. Write out one octave of the ascending scale of D minor in its several forms.

3.



—o—

# Notes on Bacon's Essays.

BY FRANCIS WATT, M.A.

## No. XXXVIII.—OF NATURE IN MEN.

### SUBSTANCE.

NATURE, or our natural disposition, can only be conquered by habit. Various means are shown by the use of which the victory may be gained; but we are not to be too confident, for nature will reassert itself when we think we have conquered it. The most fortunate in life are those whose daily tasks are suited to their original disposition.

*Essay* signified in Bacon's time something very unpretentious. He meant his essays to consist of notes and practical hints, and not of full and exhaustive discussions.

*Nature*, the original turn or character of a man's mind.

*maketh*, old form of makes; the third person singular in *th* is regularly employed in our translation of the Bible.

*In the return*, the reaction. If we use force to keep a man from that to which he is inclined, he will be the more eager in pursuit of it when he is released.

*doctrine and discourse*, instruction and reflection.

*maketh*, the verb is *singular*, though its subject is *plural*. We may suppose it to agree with its nearest subject, viz., *discourse*.

*importune*, importunate, constantly recurring; so in Bacon's 'Henry VII.' we have 'importune and incessant labour.'

*often failings*, frequent failures. *Often* is here an adjective, as in 1 Tim. v. 23, 'thine often infirmities.'

*a small proceeder, though by often prevailings, viz.*, he will advance too slowly, even though he is successful each time.

*for it breeds great perfection, if the practice be harder than the use;* if we are used to cases of special difficulty, we shall manage ordinary cases very well.

*degrees*, steps.

*arrest nature in time*, we must bring time to our help in striving against our passions.

*Four and twenty letters*, the number in the Latin alphabet.

*forbearing wine*, leaving off taking wine.

*come from drinking healths*, instead of drinking toasts or to all the company in turn.

*Optimus ille, etc.* Bacon quotes very often and very fitly; but usually from memory, and not quite accurately. The meaning here is, 'He best frees his mind who breaks the bonds that hurt his breast, and at once ceases to grieve,' from Ovid, the Latin poet.

*understanding it*, provided that.

*induce a habit of both*; what is wrong will be implanted as effectually as what is right, at the same time, and by the same method.

*Æsop's damsel.* In Æsop's fables we have the story of a girl originally a cat. She behaved very well as a human being, till one day a mouse suddenly appeared. She could not resist running after it. The so-called fables of Æsop are now usually ascribed to Babrius, a Greek fabulist—*damsel*, L. diminutive *dommicella.* Old F., *damoisiel.*

*demurely*, properly.

*avoid the occasion altogether, or put himself often to it that he may be little moved with it;* keep entirely away from temptation, or confront it so often that it entirely loses its power.

*privateness*, in his familiar hour—in his time of quiet or relaxation.

*putteth a man out of his precepts*, in anger the calm voice of reason and experience is not heard.

*sort*, fit, agree.

*multum incola, etc.* Psalm cxx. 6: 'My soul hath long dwelt with him that hateth peace.'

*when they converse in those things they do not affect*, are engaged in uncongenial occupations.

*commandeth upon himself*, determines, though disinclined, to do.

*spaces*, intervals, odd times.

—o—

## Model Time Tables for Town and Country Schools.

BY TWO INSPECTORS.

### TIME TABLE I.

OF the great importance of well drawn Time Tables it is quite needless to write now when weakly staffed schools are tasked to the very uttermost to keep their heads above water. It may be worth while, however, for us to establish our claim to speak with authority upon this important subject, by stating that we have both almost daily experience in the preparation and confirmation of Time Tables in schools of all sizes and classes, that our efforts to make such Time Tables workable have been largely crowned with success, and that those efforts have been regulated by certain fixed principles which we now proceed to enunciate.

1. Not more than 27½ hours per week should be given to Religious and Secular instruction combined in Upper Departments, and not more than 25 in Infant ones.

2. Lessons should never exceed three quarters of an hour in length in Upper Departments, nor 35 minutes in Infant ones. About 6½ hours per week should go to Reading, 3½ to Transcription, Dictation, and Composition, 7 to Arithmetic, 6 to the two extra subjects, and 2 to Singing and Recreation in Boys' Schools, and deductions must be made in mixed and Girls' Departments, so as to enable the girls to do 4 hours' needlework without having longer sittings than the boys. In Infant Schools the boys should read 4 hours a week, and write as long, spend 5 hours at 'Number,' Sing and Exercise 2½ hours, give 4½ hours to Objects, Natural History, Form, and Colour, etc., and have 2½ hours for Recreation.

3. A Time Table should not contain alternative subjects for any specified hour, *i.e.*, Reading *or* Writing, Geography *or* Grammar. On every ground it is advisable that teachers should make their *Routine* really deserving of the name.

4. (i.) Subjects such as Arithmetic and Grammar, as also Object lessons, should be given when the children are fresh, *i.e.*, the first thing in the morning or afternoon, or after an interval of recreation.

(ii.) Subjects of a less taxing kind, such as History, Geography, and Natural History, may be given as the second lesson, morning or afternoon.

(iii.) Lessons of a mechanical kind, such as writing, transcription, repetition, are better suited for a third lesson, as are lessons of a recreative character, such as Singing and Kinder-garten games and dances.

5. Time Tables should contain a summary of the number of lessons given in each class for the teachers' guidance, and where pupil teachers are instructed, a record of their lessons as well.

6. Systematic and rapid methods of changing class should be contrived, so that as little time as possible may be lost from lesson to lesson.

7. Readiness of resource should be cultivated, so as to make (i.) a reading lesson include incidental questions on Spelling, Grammar, Geography, and so forth.

(ii.) Where the Schedule IV. subjects are taught, time may be saved from 'Writing' for neat copying out of notes on these subjects, or from 'Reading' by the use of a Reader containing lessons in such subjects.

Of course none could be better aware than ourselves how much 'circumstances alter cases' where schools are concerned, and we feel that the above rules are not likely to be applicable in their entirety to many schools.

A teacher starved for staff must make the best shift he can to teach his six classes, with perhaps but one weak assistant.

Half Timers are an element which cause painful disturbance to a school. The necessity of Sewing leaves girls less time for Geography and Grammar, a fact which will, we believe, be more generally felt now that Sewing will not be so commonly taken up as an extra subject, owing to the loss of 1s. a head upon it. And many other causes will make it difficult exactly to carry out the above suggestions.

On the other hand, where the head teacher is virtually the organizing master of a large school, without even a special class of his own to teach, it will be quite possible to work out such a programme, and in most of the larger Board Schools the bulk of the above suggestions may with benefit be carried out.

But we have been asked to deal in the first instance with the very difficult case given below—a case which has compelled us to set aside some of the rules *stated* above, or at any rate to modify them considerably—and we acknowledge that the attempt has taxed the ingenuity of the draughtsman of this Time Table to the uttermost.

We trust that its adoption may prove successful; for it is a very typical case indeed

# TIME

School assembles 8.50.

Class 1 = St. IV—VII.
" 2 = " III.
" 3 = " II.
" 4 = " I.
" 5 = 1st division Infants.
" 6 = 2nd " "

MIXED SCHOOL, AVERAGE 60, INCLUDING Staff—Master, Candidate, *NO CLASS*

## MORNING.

M = Master. C = Candi-

| Day. | Class. | 9—9.40. | 9.40—50. | 9.50—10.30. | 10.30—40. | 10.40—11.20. | 11.20—11.55. | 11.55—12. |
|---|---|---|---|---|---|---|---|---|
| Monday. | 1 | M | Examination of home lessons, and setting them for next day. Register closed at 10. | Writing M | Recreation, or Marching, Singing and Tables. | Reading M | Geography (Read) M | Grace and Dismissal. |
| | 2 | M | | " M | | " M | " (Oral) M | |
| | 3 | Old Test. | | " M | | Geography M | Reading C | |
| | 4 | C | | Reading M | | Writing C | Arithmetic m | |
| | 5 6 | C | | Arithmetic C<br>Writing C | | " C<br>Reading C | Reading m<br>Figures m | |
| Tuesday. | 1 | M | | Arithmetic M | | Reading M | Composition and Dictation M | |
| | 2 | M | | " M | | " M | Dictation M | |
| | 3 | New Test. | | Reading M | | Arithmetic M | " M | |
| | 4 | C | | Arithmetic C | | Reading C | Writing m | |
| | 5 6 | C | | Reading m<br>Writing m | | Arithmetic m<br>Reading m | Form or Colour (in alternate weeks) C | |
| Wednesday. | 1 | M | | Mental Arithmetic M | | Grammar M | Composition and Dictation M | |
| | 2 | M | | " " M | | " M | Dictation M | |
| | 3 | Old Test. and Texts. | | Reading M | | Arithmetic M | Grammar M | |
| | 4 | C | | Arithmetic m | | Reading C | Dictation m | |
| | 5 6 | C | | " C<br>Figures C | | Dictation m<br>Reading m | Natural History Lesson C | |
| Thursday. | 1 | M | | Arithmetic m | | Geography (Read) M | Mapping M | |
| | 2 | M | | " m | | " (Oral) M | " M | |
| | 3 | New Test. and Hymn. | | Mental Arithmetic C | | Dictation M | Arithmetic M | |
| | 4 | C | | Geography M | | Arithmetic m | Reading C | |
| | 5 6 | C | | Transcription m<br>Mental Arithmetic m | | Reading C<br>Writing C | Object Lesson M | |
| Friday. | 1 | M | | Arithmetic M | | Reading (History) M | Composition and Dictation M | |
| | 2 | M | | " M | | " " M | Dictation M | |
| | 3 | Catechism. | | Reading M | | Arithmetic M | " M | |
| | 4 | C | | Arithmetic m | | Reading C | Transcription M | |
| | 5 6 | C | | Reading C<br>Writing C | | Dictation m<br>Mental Arith. m | Tables and Poetry C | |

Hymn and Prayers. General Inspection of Cleanliness. Religious Instruction.

Girls sew on Monday, Tuesday, Wednesday, Thursday, from 3.10 to 3.50. On Friday from 2.15 p.m.

## SUMMARY OF SCHOLARS' LESSONS.

Number of Lessons in each Subject per week.

| Class or Standard. | Read. | Writ. | Arith. | Transcr., Dictn., or Comp. | Gram. | Geog. Oral. | Map. | Collective L'ss'ns | Singing Set L'sson. | Religious Instruction. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Stand. VII. | 8 | 3 | 7 | 5 | 3 | 2 | 1 | — | 1 | 5 | 35 |
| " VI. | 8 | 3 | 7 | 5 | 3 | 2 | 1 | — | 1 | 5 | 35 |
| " V. | 8 | 3 | 7 | 5 | 3 | 2 | 1 | — | 1 | 5 | 35 |
| " IV. | 8 | 3 | 7 | 5 | 3 | 2 | 1 | — | 1 | 5 | 35 |
| " III. | 8 | 3 | 7 | 5 | 3 | 2 | 1 | — | 1 | 5 | 35 |
| " II. | 8 | 3 | 8 | 5 | 3 | 2 | — | — | 1 | 5 | 35 |
| " I. | 8 | 3 | 10 | 6 | — | 2 | — | — | 1 | 5 | 35 |
| Infnts' Cla. 5 | 9 | 3 | 7 | 6 | — | — | — | 4 | 1 | 5 | 35 |
| " " 6 | 8 | 9 | 8 | — | — | — | — | 4 | 1 | 5 | 35 |
| Girls' Needlework ... ... ... ... ... ... ... ... ... ... ... 5 | | | | | | | | | | | |

# TABLE.

7 STANDARDS AND 2 DIVISIONS OF INFANTS.
Sewing Mistress, and Monitors.
*ROOM.*
date. m=Monitor.

Class Subjects—Geography and Grammar.
Singing by Ear.

## AFTERNOON.

| 1.30—35 | 1.55—2 | 1.35—2.15. | 2.15—3. | 3—3.10. | 3.10—3.50. | 3.50—4. | P. T's. Instruction. | P. T's. Home Lessons. (Girls). | Scholars' Home Lessons. |
|---|---|---|---|---|---|---|---|---|---|
| School assembles 1.20. Grace and General Inspection of Cleanliness. | Register closed at 2. | Arithmetic M<br>,, M<br>Grammar M<br>Arithmetic } C<br>Transcriptn }<br>Counting m | Reading (Hist.) M<br>,, ,, M<br>Arithmetic M<br>Reading C<br>,, }<br>Writing } m | Recreation, or Marching, Singing, and Tables. | Grammar M<br>,, M<br>Transcription M<br>,, M<br>Arithmetic } C<br>Reading } | Home Lessons of Half Timers examined, and set for next day. | Religious Knowledge<br>Grammar<br>Reading | Arithmetic<br>Geography<br>Map<br>Domestic Economy | Geography and Map<br>,,<br>Tables & Arith.<br>,, ,,<br>,, ,,<br>Writing |
| | | Arithmetic M<br>,, M<br>Reading C<br>Geography M<br>Writing m<br>Mental Arith. m | Geography (Oral) M<br>,, (Read) M<br>Writing M<br>Arithmetic C<br>Transcription }<br>Reading } m | | Writing } C<br>,, }<br>Arithmetic<br>Transcription } M<br>Reading<br>Writing m | | Arithmetic<br>Geography<br>Needlework | School Management<br>Notes of Lesson<br>History | Grammar<br>,,<br>,,<br>Spelling<br>,,<br>Figures |
| | | Arithmetic M<br>,, M<br>Geography M<br>Arithmetic C<br>Writing }<br>Reading } m | Composition and Dictation M<br>Dictation M<br>Reading M<br>Dictation C<br>Arithmetic }<br>Writing } m | | Reading M<br>,, M<br>Writing M<br>Reading C<br>,, m<br>Counting and Mental Arithmetic m | | School Management<br>Notes of Lesson<br>History | Arithmetic<br>Grammar<br>Composition<br>Needlework | Arithmetic<br>,,<br>,,<br>,,<br>,,<br>Writing |
| | | Reading M<br>,, M<br>Arithmetic M<br>Reading C<br>Arithmetic m<br>Reading m | Grammar M<br>,, M<br>Reading M<br>Arithmetic C<br>Reading m<br>Counting and Mental Arithmetic m | | Composition and Dictation M<br>Dictation M<br>Grammar M<br>Writing }<br>,, }<br>,, } C | | Composition<br>Grammar<br>Arithmetic<br>Reading | Drawing and Music<br>Geography<br>History | Composition<br>,,<br>Spelling<br>,,<br>,,<br>Figures |
| | | Writing M<br>,, M<br>Transcription M<br>Dictation M<br>Reading }<br>Writing } C | Geography (Oral) M<br>,, (Read) M<br>Reading M<br>Mental Arith. C<br>Transcription m<br>Reading m | | Singing M<br>} C | | Drawing and Music<br>Geography<br>History<br>Writing | Scripture<br>Prayer Book<br>Grammar<br>Paraphrasing<br>Analysis<br>Needlework | Scripture<br>,,<br>,,<br>,,<br>Writing<br>,, |

Thus they only lose about one lesson in Reading, Writing, Dictation, Grammar, Arithmetic, or Geography.

## NOTES.

(*a*) With such a Staff as the above, the Master must take the Lessons requiring explanation of principles, etc., himself, while his own classes are doing quiet work, or are being looked after by the Candidate or Monitor.

(*b*) The Needlework has been arranged to interfere least with the other subjects of the Girls, who thus only lose about one lesson in each subject; 4½ hours per week is quite ample time for Needlework.

(*c*) It has not been assumed that there is a class-room for the Infants, or their work might be arranged a little differently, so as to allow them to sing by themselves, to have more repetition, etc.

(*d*) The P.T's. Home Lessons and daily Instruction bear upon each other.

(*e*) Mental Arithmetic can be given besides the prefixed Lesson for five minutes occasionally in other Arithmetic Lessons.

(*f*) Singing taught by ear would not require more than one set lesson a week, with occasional singing for five or ten minutes on other days.

(*g*) We believe that lessons for Upper Schools should be about 40 minutes long to do full justice to them. It is a mistake to get in four or five lessons, besides Scripture, in a half day.

(*h*) Poetry should be taught in the Reading and Grammar Lessons.

(*i*) It is a good plan to mark the Registers for punctuality in black ink when the school assembles, the stragglers and absentees being afterwards marked in red ink, just before the Registers are closed. This system has its obvious advantages, where prizes for good attendance are given.

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## Recent Inspection Questions.

[*The Editor respectfully solicits contributions—all of which will be regarded as* STRICTLY PRIVATE—*to this column. For obvious reasons, it cannot be stated in which district the questions have been set.*]

### Arithmetic.

STANDARD I. (DICTATED).

(1) 27 + 207 + 40 + 654 + 5 = 933. Ans.
(2) 213 − 132 = 81. Ans.
(3) 400 − 39 = 361. Ans.

STANDARD II. (DICTATED).

(1) 18,015 − 2960 = 15,055. Ans.
(2) 29,807 × 187 = 5,573,909. Ans.
(3) 71,650 ÷ 9 = 7961 − 1. Ans.

STANDARD III. (MOSTLY IN WORDS).

(1) £87 16s. 9½d. + £104 17s. 8½d. + £67 18s. 6¾d. + £86 17s. + £503 19s. 11¼d. Ans. £851 9s. 11¾d.

(2) A boy was sent to the post-office for 4½ dozen half-penny stamps and 3½ dozen penny stamps. What change had he out of half-a-sovereign?
Ans. 4s. 3d.

(3) Subtract £9,860 16s. 7¾d. from £109,672 13s. 3d. Ans. £99,811 16s. 7½d.

(4) If the dividend be 709,815, and the divisor 79, what is the quotient? Ans. 8,985.

STANDARD IV. (PARTLY IN WORDS).

(1) Divide £5,000,000 1s. 9½d. by 493.
£1,014 3s. 11¾d.—3.

(2) A ship left Hull on Tuesday at 10.30 p.m., and arrived at her destination on Thursday at 7.45 p.m. How many seconds was she on the voyage?
Ans. 162,900 sec.

(3) Multiply £13 1s. 9¾d. by 596.
£7,802 0s. 3d.

(4) Bring 98,763,421 inches to miles, etc.
Ans. 1,558m. 1,348yd. 1ft. 1in.

STANDARD V.

(1) If 4 lb. of tea cost 13s. 4d., what will 4 parcels cost, each containing 1 cwt. 2 qr. 12 lb.?
Ans. £120.

(2) 246$\frac{8}{17}$ at £3 19s. 4d. each.
Ans. £977 13s. 4d.

(3) If 18 acres cost £39, what will 17 ac. 2r. 23 per. cost? Ans. £38 4s. 6¾d.

(4) Reckon this bill:—5½ doz. at 5½d. a doz., 8¾ yds. at 2s. 1½d. a yd., 113 reels at 2s. 3d. a doz., and 560 yds. at 2½d. a yd. Ans. £8 3s. 4½d.

STANDARD VII.

(1) Find the G. C. M. of 8, 10, and 16; also the L. C. M. of 2, 5, 7, and 15. Ans. 2 and 210.

(2) Find the area of a room 12 ft. 3 in. by 7 ft. 9 in. Also the cost at 2s. 8d. a sq. ft.
Ans. 94$\frac{1}{16}$ sq. ft.; £12 13s. 2d.

(3) A has ⅘ of a ship, B has ⅔ of it, and C's share is worth £2,000. Find A and B's shares.
Ans. A £1,161$\frac{9}{11}$, B £903$\frac{7}{11}$.

(4) At what rate per cent. will £880 amount to £1,320 in 7½ years, simple interest?
Ans. 6⅔ per cent.

### Dictation.

STANDARD I.

Friend, sky, shoes, shepherd, pleasure, lifeboat, yesterday, animal, gentleman, Monday, scholar, church (twelve).

STANDARD II.

'One day the sparrow did not make his appearance at dinner, but after calling him several times from the open window I was surprised to see him come flying off a neighbouring roof. This visit he repeated, till at last a cat watching for him afterwards pounced upon him.'

STANDARD III.

'All that is needed to enjoy a bath is a piece of old carpet to stand on and to keep the floor from getting wet, and a pail of water, a piece of sponge or flannel, and two dry towels. A little care will be required in the use of the water, so as not to splash the furniture in the room, and a little self-denial, so as to rise in time to have the bath before any person is about.'

## Grammar.

STANDARD II.

Nouns, verbs and adjectives in the following verses—

'It is a pleasant thing
To walk at early day,
To see the pretty flowers,
And smell the sweet new hay.

The sun is warm and bright,
The sky is clear and blue;
And all the trees and flowers
Are wet with drops of dew.'

STANDARD III.

All the parts of speech in the following—
'And the boys came to school and had their examination to-day.'

STANDARD IV.

Parse—
'The master sent home the boys very early.'

'The hand of Douglas is his own,
And never shall in friendly grasp
The hand of such as Marmion clasp.'

STANDARDS V. and VI.

Parse and analyse—
'They thought it was time to go home.'

—o—

## Publications Reviewed.

**Class Lessons on Euclid.** By Marianne Nops. London: Kegan Paul and Co.

This book is an attempt to reduce to writing what any good mathematical teacher would naturally say to a class who were being taught Euclid without a text-book, and would, no doubt, prove useful to a young man wishing to teach himself Euclid. But excepting for the Riders, which are numerous and well arranged, we cannot particularly recommend its introduction into schools; for though it contains Euclid's text of the first two books, which now can be purchased for one penny a piece, it is unnecessarily bulky and, we presume, expensive book for so small a portion of mathematical study. We cordially recommend the book, however, as above to those wishing to teach themselves, and to young *unmathematical* teachers, who are specially engaged to teach other subjects, but are, alas! supposed to be able to teach beginners the rudiments of Euclid or anything else, whereas these beginners are the very pupils who require their teacher to be not only one with long experience in teaching, but also thoroughly acquainted with the entire subject.

**The Local Examination History.** By Dr. R. S. Pringle. London: John Heywood.

Dr. Pringle has prepared in this book a valuable epitome of the principal events that have occurred in the British Isles from the Roman Invasion to the present time. The history, or rather abstract of each reign, is divided into three portions, viz., first, as to the 'claim' to the crown; second, as to the principal events; and, lastly, as to "the Eminent Persons" who lived at the time, genealogical trees being also frequently inserted. For a final glance at the subject just before examination it would be invaluable; but as a school text-book, unaccompanied by a fuller history, it would be almost cruel to put it into the hands of boys and girls, nor indeed does the author expect it to be so used. A complete index would be a great addition, as well as some examination papers recently given; on the whole, it is more a book for teachers than students; the latter ought to be taught to make such a book for themselves, as, in fact, the majority of industrious students do. The book is well printed, nicely got up, and very cheap, and as such will doubtless have a large sale.

**Word Building in English.** By C. P. Mason, B.A., F.C.P. (George Bell and Sons.)

Is an extract from the author's English Grammar, and is reprinted to put into the hands of masters and pupil-teachers a cheap work on the Etymology of our language. The book is well arranged, with many examples, and would be found very useful to any student preparing for examination in English Grammar. The native and foreign elements of our language are well shown. The affixes and suffixes, Teutonic, Latin, and Greek, are well explained and arranged. And at the end of the work there are lists of miscellaneous words adopted from ancient and modern languages, with the exception, strange to say, of Greek, though the author acknowledges on p. 23 that 'the greater part of the abstract terms in English..... are of Latin or Greek origin.' On the following pages he gives some six hundred Latin words with their English derivatives, but not one Greek word. This want could and ought to be supplied in the next edition.

**Shakspere for Schools.** The Merchant of Venice, as abridged by Charles Kemble. George Bell and Sons.

The notes hereto, for school use, are the chief novelty. As to the abridgment itself, no doubt our great dramatist is too lengthy for these rapid days; but doubtless many excellences must be lost by such sharp shortening. Moreover, sometimes an alteration for the worse is detectable; as this; in the ordinary Shakesperean editions Portia says (Act iv. sc. 1):—

'It is so. Are there scales to weigh the flesh?'

and we do not see why grammar and rhythm should be alike discountenanced in this version, thus:—

'It is so. Are there balance (*sic*) here to weigh
The flesh?'

**Shakspere for Schools.** Julius Cæsar, as abridged by Charles Kemble. Bell and Sons.

Another of the series, similarly annotated. Professor Dowden's note is especially valuable.

**'Helps for Latin Students.'** By W. T. Jeffcott and G. J. Tossell. London: Longmans and Co.

Is a well selected collection of Latin extracts from all the best known authors, the last being some short scenes from Plautus and Terence. These extracts are followed

by forty short accidence and grammar papers, which would prepare boys well for the grammar papers given in all classical examinations of the present day. After these papers, 'there are classified questions on the parts of speech,' which are very exhaustive. Then come some sixty sentences, each containing an error to be detected and corrected. These are followed by a quantity of technical expressions and short English sentences for translation; and the little book finishes with a few pages of derivations taken from Dr. Smith's Dictionary. The book is somewhat marred by a too flattering preface written by another master, or probably principal of the school where the authors labour. In it, we are assured that the book is a 'storehouse of useful knowledge,' and one that can be used for years by pupils of all ages.

**'The Family Failing.'** By Darley Dale. London, Glasgow, Edinburgh, and Dublin: Blackie and Son. 1883.

Discontent is 'the family failing' which makes the sons and daughters of Mr. Kilgour dissatisfied with all their surroundings, though when the story opens these are such as belong to wealth, and consequent comforts and luxury. Suddenly loss of fortune comes and they retire to Jersey, where, beginning with a shipwreck on the way, more adventures befall the family in six months than happen to most people in the course of a long life.

But the best result of this loss of fortune is that, when after a while the family return to wealth and London, 'discontent' is left behind, to the satisfaction of all concerned.

The tale is evidently intended as a boys' book, as it deals largely with schoolboy pranks and practical jokes, but there is also plenty of love-making; and May, the heroine, though rather too much given to fainting on all occasions, is not altogether an uninteresting young lady; and feminine readers will be glad that her wooing, begun rather inauspiciously, ends, as they would wish it to, in a happy marriage.

**Philip Phillips: The Story of his Life.** London: Wesleyan Methodist Sunday-School Union.

A pleasantly written sketch of the life and labours of Philip Phillips, commonly known as the 'Singing Pilgrim,' from a book of sacred melodies compiled by him, and which, like others of his works, has had an immense sale. Both here and in his native land, America, Mr. Phillips is well known, and his services of Gospel song have been listened to with delight and benefit by thousands of people, many conversions resulting from this novel method of imparting religious truth.

**The World at Home.** Standards I. and III. London: Nelson and Sons.

After a very careful perusal of these two neatly clad books we are compelled to bestow upon them our warmest approbation. Apart from their beauty—beauty of type, maps, illustrations, and paper—what strikes us most is their *useableness*. In our opinion the little Geographical Reader designed for the first standard is a model of what such a book ought to be. And the volume for Standard III. is hardly less meritorious. We strongly advise teachers on the outlook for a new set of Geographical Readers to examine the 'World at Home' series before making their final selection.

**Moss's Handbook of the New Code.** London: W. Isbister (Lim.).

Mr. Moss is the clerk of the Sheffield School Board. He has, by his conscientious work, made his name familiar to all who take an interest in elementary education. The Handbook before us is a capital compilation, which must prove particularly acceptable to school managers.

## Publications Received.

**Agriculture—**
(1) Principles of Agriculture. Stages I., II., and III. Chambers.

**Arithmetic—**
(1) New Graded Arithmetic. Standards I. to VII. John Heywood.
(2) The Try Arithmetic. Standard I. John Heywood.
(3) Morrison's Arithmetic. Standards I. to VII. Gall and Inglis.

**Composition—**
(1) Handbook of English Composition Exercises. Blackie and Son.

**Drawing and Painting—**
(1) Simple Lessons in Landscape Painting. Nos. 1, 2, 3, and 4. Blackie and Son.

**English—**
(1) Word Building in English. Bell and Sons.

**French—**
(1) La Bagatelle. Crosby Lockwood and Co.

**Geography—**
(1) The National Atlas. 32 Coloured Maps. John Heywood.

**German—**
(1) Goethe—Select Poems—'Annotated German Classics.' Sonnenschein and Co.

**History—**
(1) Local Examination History. John Heywood.

**Miscellaneous—**
(1) Farnsworth's Domino Sheets and Cards. Ledsham.
(2) Egypt, Palestine, and Phœnicia: A Visit to Sacred Lands. By Felix Bovet. Hodder and Stoughton.
(3) Variorum Teachers' Bible. Eyre and Spottiswoode.
(4) Teachers' Prayer-Book. Eyre and Spottiswoode.
(5) Musician-Guide for Pianoforte Students. Sonnenschein and Co.
(6) School Drill. Home and Colonial Society.
(7) The Oxford and Cambridge Date Card. J. Boulton and Co.
(8) Warming and Lighting the Dwelling. A pamphlet. John Heywood.
(9) Poetry for the Young. Griffith and Farran.
(10) Life's Daily Ministry. By Mrs. E. R. Pitman. Blackie and Son.
(11) My Governess Life. By Mrs. E. R. Pitman. Blackie and Son.
(12) Dora. By Mrs. R. H. Read. Blackie and Son.

**Music and Singing—**
(1) Code Singing Tests. Tonic Sol-fa Notation.
(2) ,, ,, ,, Staff ,,

**Penmanship—**
(1) Specimens of Civil Service Penmanship. Compiled by J. Keefe, F.S.Sc. (Lond.). North-Western Educational Training Co.

**Periodicals and Magazines—**
(1) Book of Sports and Pastimes. Part XII. Cassell.
(2) Universal Instructor. Part XXIX. Ward, Lock, and Co.
(3) Our Little Ones. Vol. III., No. 5. Griffith and Farran.
(4) Longmans Magazine. No. 6.

**Poetry—**
(1) Poetry for Repetition, for Standards I., II., and III. Blackie and Son.

**Political Economy—**
(1) Problems in Political Economy. Swan Sonnenschein and Co.

**Readers—**
(1) Special Merit Readers. Standard III. Sonnenschein and Co.
(2) Robinson Crusoe. Marcus Ward and Co.
(3) Bell's Reading Books: 'Vicar of Wakefield,' 'Gulliver's Travels,' and 'Lamb's Tales from Shakspere.' G. Bell and Son.
(4) Third Historical Reader. W. Isbister.

# Query Column.

## RULES.

1. Each correspondent is restricted to *one question*. We should be much obliged if correspondents, who send questions for solution, would give (if possible) the required answer, and the source from which the question is obtained.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. ☞ When a pseudonym is adopted it should be written at the end of the query, and the real name and address on a separate piece of paper.

4. Correspondents are requested to write their queries *legibly*, and on one side of the paper only.

5. Replies will not be sent through the post.

6. Queries must reach the office *not later than the 12th of the month*, or they cannot be attended to in the following issue.

*** All communications for this column should be addressed—'*The Query Editor*,' *The Practical Teacher, Pilgrim Street, Ludgate Hill, London, E.C.*

### Arithmetic.

1. INQUISITIVE.—Two trains, whose lengths are 26 and 24 yards, travel at rates of 20 and 30 miles respectively. Find the time they will take to pass each other when they move

(1) In the same direction;
(2) In the opposite direction.
(*Edinburgh*, 1882.)

(1) Time $= \frac{(26+24)\text{ yds.}}{(30-20)\text{ mls.}}$ of 1 hr.
$= \frac{50\text{ yds.}}{10\text{ mls.}}$ of 1 hr.
$= \frac{1}{352}$ of 1 hr.
$= \frac{3600}{352}$ sec.
$= \frac{450}{44}$ sec.
$= 10\frac{5}{11}$ sec. Ans.

(2) Time $= \frac{(26+24)\text{ yds.}}{(30+20)\text{ mls.}}$ of 1 hr.
$= \frac{50\text{ yds.}}{50\text{ mls.}}$ of 1 hr.
$= \frac{1}{1760}$ of 1 hr.
$= \frac{3600}{1760}$ sec.
$= \frac{45}{22}$ sec.
$= 2\frac{1}{11}$ sec. Ans.

2. DOUBTFUL.—A man, his wife and boy worked in a garden; the man for 2 days, his wife for $3\frac{1}{2}$ days, and the boy for 3 days; their daily wages were—man's to woman's in the ratio of 7 to 4, and man's to boy's in the ratio of 7 to 3. Their total earnings amounted to £1. What were the daily wages of each?

$(2\times7)+(3\frac{1}{2}\times4)+(3\times3)$
$=14+14+9$
$=37.$

Man's wages $= \frac{14}{37}$ of £1,
Woman's ,, $= \frac{14}{37}$ ,, ,,
Boy's ,, $= \frac{9}{37}$ ,, ,,

Man's daily wages $= \frac{1}{2}$ of $\frac{14}{37}$ of £1
$= \frac{7}{37}$ of £1
$= 3\text{s. } 9\frac{1}{37}\text{d.}$

Woman's ,, $= \frac{1}{3\frac{1}{2}}$ of $\frac{14}{37}$ of £1
$= \frac{2}{7}$ of $\frac{14}{37}$ of £1
$= \frac{4}{37}$ of £1
$= 2\text{s. } 1\frac{33}{37}\text{d.}$

Boy's ,, $= \frac{1}{3}$ of $\frac{9}{37}$ of £1
$= \frac{3}{37}$ of £1
$= 1\text{s. } 7\frac{17}{37}\text{d.}$

Or, boy's daily wages $= 3\text{s. } 9\frac{1}{37}\text{d.} - 2\text{s. } 1\frac{33}{37}\text{d.}$
$= 1\text{s. } 7\frac{17}{37}\text{d.}$

3. MANCHESTER.—The price of 2 turkeys and 9 fowls is £2 18s. 6d., and the price of 5 turkeys and 2 fowls is £4 8s. 2d.; find the price of a turkey and a fowl. (*Barnard Smith.*)

(1) Cost of 2 turkeys + cost of 9 fowls = £2 18s. 6d., or 702d.,
(2) Cost of 5 turkeys + cost of 2 fowls = £4 8s. 2d., or 1,058d.;

(1) × 5} Cost of 10 turkeys + cost of 45 fowls = 3,510d.,
(2) × 2} Cost of 10 turkeys + cost of 4 fowls = 2,116d.;
∴ Cost of (45 − 4) fowls = 3,510d. − 2,116d.
Cost of 41 fowls = 1,394d.
∴ Cost of a fowl = 1,394d. ÷ 41
= 34d.
= 2s. 10d.

(1) Cost of 2 turkeys + cost of 9 fowls = 702d.
Cost of 2 turkeys = 702d. − (34d. × 9)
= 702d. − 306d.
= 396d.
∴ Cost of a turkey = 396d. ÷ 2
= 198d.
= 16s. 6d.

4. ROMEO II.—If an oz. troy of standard silver, of which 37 in 40 parts of the whole are fine, be worth 5s. $1\frac{1}{2}$d., and copper 5 guineas per cwt., what is the ratio of the value of fine silver to that of copper? (*Colenso.*)

Value of 1 lb. (troy) of fine silver $= 5\text{s. } 1\frac{1}{2}\text{d.} \times \frac{40}{37} \times 12$
$= \left(\frac{41}{2} \times \frac{\overset{5}{\cancel{40}}}{37} \times \frac{\overset{6}{\cancel{12}}}{1}\right)\text{s.}$
$= 66\frac{6}{37}\text{s.};$

Value of 1 lb. (avoir.) of copper $= \frac{5\text{ guineas}}{112}$
$= \frac{105}{112}\text{s.}$
$= \frac{15}{16}\text{s.}$

1 lb. avoirdupois weighs 7,000 grains troy,
,, troy ,, 5,760 ,, ,,
∴ Value of fine silver : value of copper

$:: \frac{2460}{37} \times \frac{7000}{5760} : \frac{15}{16}$

$:: \frac{\overset{41}{\cancel{2460}}}{37} \times \frac{700}{\overset{576}{\cancel{5760}}} \times \frac{\overset{1}{\cancel{16}}}{\underset{1}{\cancel{15}}} : 1$

$:: \frac{28700}{333} : 1$

$:: 86{\cdot}186 : 1.$

5. DUMFRIESSHIRE.—An electric cable is laid between two ports, and it is found that the gross annual receipts amount to 20 per cent. on the original outlay; the annual cost of repairs is 2 per cent. on the original cost, and the expense of working is found to be £600 a year, in addition to 20 per cent on the net receipts. After a year a second cable is laid down, and it is found that the gross receipts and the expense of working are doubled, while the cost of repairs for the new cable is only 1 per cent., and that the net receipts now amount to £14,500. Find the cost of a cable, and the net receipts for the first year.

(1) 20 per cent. of cost of a cable = net receipts for first year + 2 per cent of cost of a cable + £600 + 20 per cent. of net receipts for first year;
(20 − 2) per cent. of cost of a cable = net receipts for first year + £600 + $\frac{1}{5}$ net receipts for first year;

18 per cent. of cost of a cable = $\frac{9}{10}$ net receipts for first year + £600;
$\frac{9}{10}$ net receipts for first year = $\frac{9}{100}$ of cost of a cable − £600;
∴ Net receipts for first year = $\frac{10}{9}$($\frac{9}{100}$ of cost of a cable − £600)
= $\frac{1}{10}$ of cost of a cable − £500.

(2) 40 per cent. of cost of a cable = net receipts for second year + 3 per cent. of cost of a cable + 2(£600 + 20 per. cent. of net receipts for first year);
(40 − 3) per cent. of cost of a cable = £14,500 + £1,200 + $\frac{9}{10}$ net receipts for first year;
37 per cent. of cost of a cable = $\frac{9}{10}$ net receipts for first year + £15,700;
$\frac{9}{10}$ net receipts for first year = $\frac{37}{100}$ of cost of a cable − £15,700
∴ Net receipts for first year = $\frac{10}{9}$($\frac{37}{100}$ of cost of a cable − £15,700)
= $\frac{37}{90}$ of cost of a cable − £39,250.

∴ $\frac{17}{90}$ of cost of a cable − £39,250 = $\frac{8}{90}$ of cost of a cable − £500;
($\frac{17}{90}$ − $\frac{8}{90}$) of cost of a cable = £39,250 − £500;
$\frac{9}{90}$ of cost of a cable = £38,750;
∴ Cost of a cable = £38,750 × $\frac{90}{9}$
= £50,000.

Net receipts for first year = $\frac{9}{10}$ of cost of a cable − £500
= $\frac{9}{10}$ of £50,000 − £500
= £7,500 − £500
= £700.

6. F. S.—A fraudulent tradesman removed from a cask a certain quantity of whisky that contained 64 per cent. of alcohol, replacing it by diluted spirit containing only 8 per cent. of alcohol. The cask was then of 50 per cent. strength. What portion of the whole quantity did he take out? (*Civil Service Examination*, November, 1879.)

Difference in strength between portion taken and reduced strength of whole = (64 − 50) per cent.
= 14 per cent.;
Difference in strength between portion added and reduced strength of whole = (50 − 8) per cent.
= 42 per cent.;
∴ Portion taken : Portion remaining :: 14 : 42
:: 1 : 3;
∴ Portion taken = $\frac{1}{4}$ of whole quantity.

7. P. T.—I am asked to supply a ton of fusible metal consisting of 8 parts by weight of bismuth, 5 lead, and 3 tin. The only bismuth I have in stock is an alloy consisting of 9 parts bismuth, 4 lead, and 3 tin. How much of my alloy must I take, and how much lead and tin must I add to make up the order?—(*Mansford.*)

In first alloy, 8 parts out of 16 are bismuth,
,, second ,, 9 ,, ,, ,, ;
∴ Quantity of alloy = $\frac{8}{9}$ ton
= 17$\frac{7}{9}$ cwt.;
,, ,, lead in this alloy = ($\frac{4}{16}$ of $\frac{8}{9}$) ton
= ($\frac{1}{4}$ of $\frac{8}{9}$) ton
= $\frac{2}{9}$ ton,
,, ,, ,, required = $\frac{5}{16}$ ton,
∴ ,, ,, ,, in addition = ($\frac{5}{16}$ − $\frac{2}{9}$) ton
= $\frac{13}{144}$ ton
= 1$\frac{13}{16}$ cwt.;
,, ,, tin in this alloy = ($\frac{3}{16}$ of $\frac{8}{9}$) ton
= $\frac{1}{6}$ ton,
,, ,, ,, required = $\frac{3}{16}$ ton,
∴ ,, ,, ,, in addition = ($\frac{3}{16}$ − $\frac{1}{6}$) ton
= $\frac{1}{48}$ ton
= $\frac{7}{12}$ cwt.

8. T. H.—If 4 men, working 7 hours a day, do a piece of work in 5 days and 1 hour, how many hours a day must 6 men work to do twice as much in 6 days and 4 hours, allowing for half-holiday on one of the six days. (*Cambridge Arithmetical Paper*, Seniors, 1873.)

4 men can do a piece of work in 5 days and 1 hour, or 36 hours,
6 ,, ,, the same work in $\frac{36 \times 4}{6}$ hours = 24 hours,
6 ,, ,, twice as much work in 48 hours;
5$\frac{1}{2}$ days and 4 hours = 48 hours,
5$\frac{1}{2}$ days = 44 hours,
∴ 1 day = (44 ÷ 5$\frac{1}{2}$) hours
= 8 hours.

∴ They must work 8 hours a day.

9. J. EDWARDS, Burton-on-Trent.—A and B embark in partnership for 7 years. B is to have $\frac{1}{10}$ of the net profits during the first half of the time, and one-half of them afterwards. After 4$\frac{1}{2}$ years, owing to a duty being lowered, the annual profits, which had so far remained stationary, are suddenly increased in the proportion of 6 : 5; but at the same time they are reduced by the creation of an income-tax of 7d. in the £. By the end of 7 years B's share of profits amounted to £976. What were the annual profits before duty was lowered? (*Excise*, November, 1881.)

B's share, before reduction of duty = ($\frac{1}{10}$ of original annual profits × 3$\frac{1}{2}$)
+ $\frac{1}{2}$ original annual profits
= {($\frac{1}{10}$ × 3$\frac{1}{2}$) + $\frac{1}{2}$} of original annual profits
= { $\frac{35}{100}$ + $\frac{1}{2}$ ,, ,,
= $\frac{17}{20}$ of original annual profits;
,, ,, after ,, ,, = $\frac{1}{2}$ original annual profits × $\frac{5}{6}$ × $\frac{233}{240}$ × 2$\frac{1}{2}$
= $\left(\frac{1}{2} \times \frac{5}{6} \times \frac{233}{240} \times \frac{5}{2}\right)$ of original annual profits
= $\frac{233}{288}$ of original annual profits;
∴ ($\frac{17}{20}$ + $\frac{233}{288}$) of original annual profits = £976,
$\frac{811}{720}$ ,, ,, ,, ,, = ,,
∴ Original annual profits = £976 × $\frac{720}{811}$
= £320.

*Note.*—It is impossible for us to state what percentage of marks your writing would obtain at the Civil Service Examinations? It is rather too small.

10. J. T.—A street, 444 yards long and 20 yards wide, is to be paved with wooden blocks 9 inches long, 4 inches wide, and 6 inches deep; the blocks are to be placed lengthways in rows across the street, with a space of 1 inch between;—find the number of blocks required, and the cost at 2s. 6d. per cubic foot of wood. (*Ricks.*)

No. of blocks in width = 20 yds. ÷ 9 in.
= 20 × 4
= 80;
,, ,, ,, length = (444 yds. + 1 in.) ÷ (4 + 1) in.
= 15,985 in. ÷ 5 in.
= 3197;
∴ No. of blocks required = 3197 × 80
= 255,760.

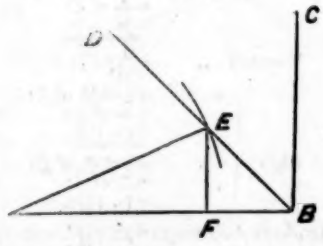
∴ Cost = $\left(\frac{15,985}{288,720} \times \frac{5}{4} \times \frac{1}{3} \times \frac{1}{2} \times \frac{1}{8}\right)$£
= £3996 5s.

*Note.*—Please copy your queries correctly. You gave one of the items incorrectly, and thus caused a great deal of extra labour.

## Geometry.

1. ANTI-HUMBUG.—Given the hypotenuse of a right-angled triangle, and the sum (or difference) of the other two sides to construct the triangle.

(1) Sum of the other two sides




Take AB = the given sum of the sides.
At B draw BC at right angles to AB, and bisect angle ABC by the straight line BD.
From centre A, and with radius equal to the given hypotenuse, describe a circle cutting BD at a point E.

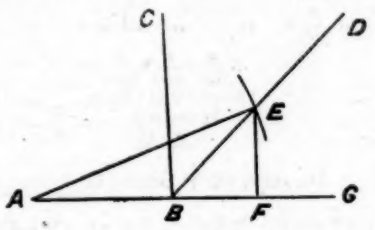
From E draw EF at right angles to AB.
Then AEF shall be the triangle required.

*Proof.*—Angle AFE is a right angle by construction, and the hypotenuse AE is equal to the given hypotenuse.

Angle EFB is a right angle, (Con.)
" FBE is half a right angle, "
∴ " FEB " " " ; (I. 32.)
wherefore FE=FB. (I. 6.)
∴ Sum of sides AF, FE=AB.
Q.E.F.

*Note.*—In order that the construction may be possible, the given hypotenuse must not be less than the perpendicular from A on BD, and if this condition be satisfied there may be two solutions.

(2) Difference of the other two sides.



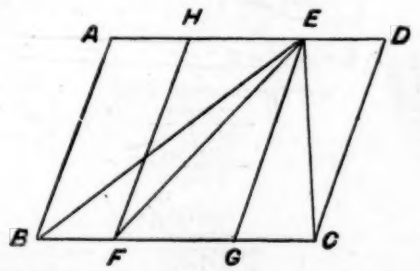

Take AB=the given difference of the sides.
Produce AB to G.
At B draw BC at right angles to AG, and bisect angle GBC by the straight line BD.
From centre A, and with radius equal to the given hypotenuse, describe a circle cutting BD at a point E.
From E draw EF at right angles to AG.
Then AEF shall be the triangle required.

*Proof.*—Angle AFE is a right angle by construction, and the hypotenuse AE is equal to the given hypotenuse.

Angle EFB is a right angle, (Con.)
" FBE is half a right angle, "
∴ " FEB " " " ; (I. 32.)
wherefore FE=FB. (I. 6.)
∴ Difference of sides AF, FE=AB.
Q.E.F.

*Note.*—In order that the construction may be possible, the given hypotenuse must be greater than the given difference of the sides.

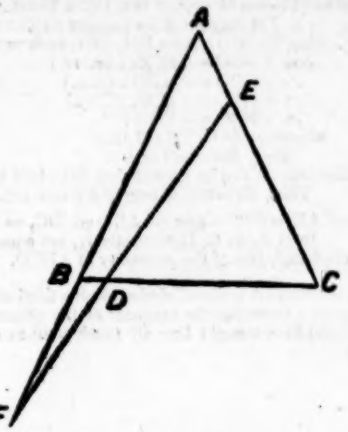
2. PEDROTALLAGALA.—A straight line is drawn bisecting a parallelogram ABCD, and meeting AD at E and BC at F: show that the triangles EBF and CED are equal.




Through E and F draw EG and FH parallel to AB or CD.

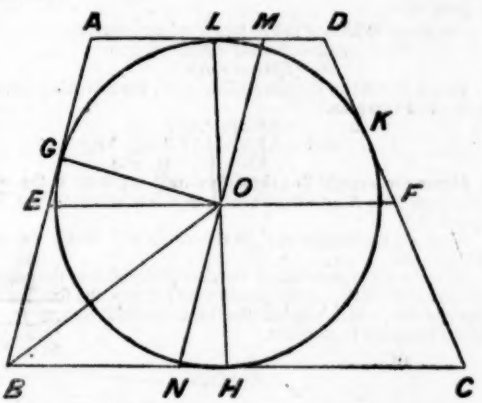
*Proof.*—Figure ABFE=figure EFCD, (Hyp.) and △HFE=△EFG, (I. 34.)
∴ parallelogram ABFH=parallelogram EGCD; (Ax. 3.)
△EBF=half of parallelogram ABFH, (I. 41.)
△CED= " EGCD;
∴ △EBF=△CED.
Q.E.D.

3. R. B.—ABC is an isosceles triangle, and D any point in BC. In CA the point E is taken, making CE equal to CD; ED is then joined, and produced to meet AB produced in F. Prove that three times the angle AEF is greater than four right angles by the angle AFE. (*Colenso.*)




*Proof.*—∠AEF=∠ECD+△CDE, (I. 32.)
=∠ACB+∠CED,
=∠ACB+∠EAF+∠AFE;
∴ twice ∠AEF=twice ∠ACB+twice ∠EAF+twice ∠AFE;
But, twice ∠ACB+∠EAF (that is, ∠BAC)=two right angles; (I. 32.)
∴ twice ∠AEF=two right angles+∠EAF+twice ∠AFE;
Three times ∠AEF=two right angles+∠AEF+∠EAF+twice △AFE;
But, ∠AEF+△EAF+△AFE=two right angles;
∴ Three times ∠AEF=four right angles+∠AFE;
Wherefore, three times the angle AEF is greater than four right angles by the angle AFE. Q. E. D.

4. PUPIL TEACHER.—If a quadrilateral, having two of its sides parallel, be described about a circle, a straight line drawn through the centre of the circle, parallel to either of the two parallel sides, and terminated by the other two sides, shall be equal to a fourth part of the perimeter of the figure (*Tod-hunter.*)




Let ABCD be a quadrilateral described about a circle, and having the side AD parallel to the side BC. Let O be the centre of the circle; through O draw EOF parallel to AD or BC, and terminated by AB and DC.
Then EF shall be equal to a fourth-part of the perimeter of the quadrilateral ABCD.
Let the circle touch AB at G, BC at H, CD at K, and DA at L.
Join BO, GO; draw the straight line LOH, and through O draw MON parallel to AB.

*Proof.*—In the triangles LOM, HON,
∠LOM=∠HON, (I. 15.)
∠LMO=∠HNO, (I. 29.)
and side LO=side HO, (Def. 15.)
∴ side MO=side NO; (I. 26.)
wherefore MN is bisected at O;
Now, AE=MO, and BE=NO; (I. 34.)
∴ AB is bisected at E.

Similarly, it can be proved that DC is bisected at F.

The tangent BG = tangent BH,

$\therefore$ sides BG, GO = sides BH, HO, each to each,

and $\angle BGO = \angle BHO$, (Ax. 11.)

$\therefore \angle GBO = \angle HBO$; (I. 4.)

but $\angle HBO = \angle EOB$, (I. 29.)

$\therefore \angle EBO = \angle EOB$;

wherefore EO = EB; (I. 6.)

thus, EO = half of AB.

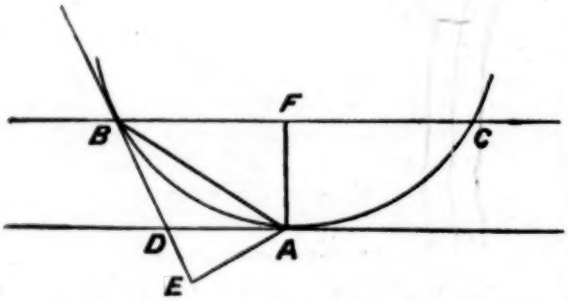
Similarly, it can be proved that FO = half of DC.

Thus, EF = half of sum of AB and DC.

But sum of AD and BC = sum of AB and DC, as the tangents from A, B, C, D, respectively, are equal.

$\therefore$ EF = fourth-part of the perimeter of ABCD. Q. E. D.

5. TEACHER.—A series of circles touch a fixed straight line at a fixed point; show that the tangents at the points where they cut a parallel fixed straight line all touch a fixed circle. (*Todhunter.*)




Let A be the fixed point in the fixed straight line. Let a circle which touches the fixed straight line at A cut the fixed parallel straight line at B and C.

Draw a tangent to this circle at B, and let it meet the fixed straight line at D.

Draw AE perpendicular to BD produced, and AF perpendicular to BC.

Join AB.

*Proof.*—$\angle DBA = \angle DAB$, (see previous query,)

and $\angle DAB = \angle ABF$ (I. 29.)

$\therefore \angle DBA = \angle ABF$.

Hence in the two triangles ABE, ABF, the side AB is common to the two triangles,

$\angle ABE = \angle ABF$,

and $\angle AEB = \angle AFB$ (Ax. 11.)

$\therefore$ AE = AF. (I. 26.)

Hence the straight line through E will touch at E the circle described from A as a centre with a radius equal to the fixed length AF.

Similarly the tangent at C to the circle will touch the same fixed circle.

In the same manner it can be demonstrated that the tangents to any other circle, at the points where it cuts the fixed parallel straight line, which touches the fixed straight line at A, will touch the same fixed circle. Q. E. D.

## Algebra.

SABDEN.—Two passengers have together 5 cwt. of luggage, and are charged for the excess above the weight allowed 5s. 2d. and 9s. 10d. respectively; if the luggage had all belonged to one of them he would have been charged 19s. 2d. Find how much luggage each passenger is allowed without charge.

Let $x$ = No. of lbs. allowed to one passenger,

Then $2x$ = " " two passengers;

The charge for excess luggage of $(560 - 2x)$ lbs. is (5s. 2d. + 9s. 10d.), or 180d.;

The charge for excess luggage of $(560 - x)$ lbs. is 19s. 2d., or 230d.;

$\therefore$ Charge per lb. in pence for excess luggage

$$= \frac{180}{560 - 2x}, \text{ or } \frac{230}{560 - x};$$

$$\therefore \frac{180}{560 - 2x} = \frac{230}{560 - x}$$

$$\frac{9}{280 - x} = \frac{23}{560 - x}$$

$$5{,}040 - 9x = 6{,}440 - 23x$$

$$23x - 9x = 6{,}440 - 5{,}040$$

$$14x = 1{,}400$$

$$\therefore x = 100.$$

$\therefore$ Quantity of luggage allowed = 100 lbs.

2. CORRESPONDENT.—A vessel can be emptied by three taps: by the first alone it could be emptied in 80 minutes, by the second alone in 200 minutes, and by the third alone in 5 hours. In what time will the vessel be emptied if all the taps are opened? (*Todhunter.*)

Let $x$ = No. of minutes to empty the vessel;

Then, $\frac{x}{80}$ = part emptied by 1st tap,

" $\frac{x}{200}$ = " " 2nd " ,

" $\frac{x}{300}$ = " " 3rd " .

$$\therefore \frac{x}{80} + \frac{x}{200} + \frac{x}{300} = 1$$

$$15x + 6x + 4x = 1200$$

$$25x = 1200$$

$$\therefore x = 48.$$

$\therefore$ The vessel will be emptied in 48 minutes.

3. RALPHO.—Find the L.C.M. of $x^1 - 1$, $x^2 + 1$, $x^4 + 1$, $x^8 - 1$.

$$x^8 - 1 = (x^4 + 1)(x^4 - 1)$$

$$= (x^4 + 1)(x^2 + 1)(x^2 - 1);$$

$\therefore$ L.C.M. of $x^2 - 1$, $x^2 + 1$, $x^4 + 1$, $x^8 - 1 = x^8 - 1$.

4. H. J. L.—How much per year must be laid by at 5 per cent. compound interest to make £600 in 75 years?

Let A be an annual payment in pounds, $n$ the number of years, R the amount of one pound in one year, and M the total amount in pounds.

Then, $M = \frac{R^n - 1}{R - 1} A$;

$$\therefore 600 = \frac{\left(\frac{21}{20}\right)^{75} - 1}{\frac{21}{20} - 1} A$$

$$\left\{\begin{aligned} \text{Log}\left(\tfrac{21}{20}\right)^{75} &= (\log. 21 - \log. 20) \times 75 \\ &= (1{\cdot}3222193 - 1{\cdot}30103) \times 75 \\ &= {\cdot}0211893 \times 75 \\ &= 1{\cdot}5891975 \\ &= \log. 38{\cdot}83269. \end{aligned}\right.$$

$$600 = \frac{38{\cdot}83269 - 1}{\frac{1}{20}} A$$

$$\therefore A = \frac{30}{37{\cdot}83269} £$$

$$= 37{\cdot}83269)600{\cdot}00000(15\text{s.}$$

$$\begin{array}{r} 3783269 \\ \hline 22167310 \\ 18916345 \\ \hline 3250965 \\ 12 \\ \hline 39011580(10\tfrac{1}{2}\text{d.} \\ 3783269 \\ \hline 1178890 \\ 4 \\ \hline 4715560 \\ 3783269 \\ \hline 932291 \end{array}$$

$= 15\text{s. } 10\tfrac{1}{2}\text{d. nearly.}$ Ans.

5. TREE.—If the cost of making an embankment vary as the length if the area of the transverse section and height be constant, and as the height if the area of the transverse section and length be constant, and as the area of the transverse section if the length and height be constant, and an embankment 1 mile long, 10 feet high, and 12 feet broad, cost £9,600, find the cost of an

embankment half-a-mile long, 16 feet high, and 15 feet broad. (*Todhunter's* 'Algebra for Beginners.')

Length of first embankment = 1 mile
" " second " = $\frac{1}{2}$ " ;
Height " first " = 10 feet,
" " second " = 16 " ;
Area of transv. section " first " = (10 × 12) sq. ft.
= 120 sq ft. ;
" " " " second " = (16 × 15) sq. ft.
= 240 sq. ft. ;

$\therefore$ 1 × 10 × 120 : $\frac{1}{2}$ × 16 × 240 :: £9,600 : cost of second embankment.

£ : 8 :: £9600 : cost
1920
= £15,360 Ans.

6. TULEDOGER.—Suppose that gold is worth 15 times as much as silver, and that silver is worth 100 times as much as copper, find the proportions of the metals in a certain coin worth 4s., having given that a coin with double as much gold, the same quantity of silver, and 5 times as much copper, would be worth 7s. 9d., a coin having 5 times as much gold, the same silver, and twice as much copper would be worth 19s., and lastly, that coin with the same gold, double the silver, and one-half the copper, would be worth 4s. 3d. (*London University Matriculation*, January, 1882.)

Let $x$ = value of gold in shillings in coin worth 4s.,
" $y$ = " " silver " " " " " " ;
And " $z$ = " " copper, " " " " " " ;
$\therefore$ (1) $x + y + z = 4$
(2) $2x + y + 5z = 7\frac{3}{4}$
(3) $5x + y + 2z = 19$
(4) $x + 2y + \frac{z}{2} = 4\frac{1}{4}$

Subtracting (1) from (2), $x + 4z = 3\frac{3}{4}$ (5)
" (1) " (3), $4x + z = 15$ (6)
Multiplying (5) by 4, $4x + 16z = 15$,
$\therefore z = 0$, and $4x = 15$
$\therefore x = 3\frac{3}{4}$.
(1) $x + y + z = 4$
$\therefore y = \frac{1}{4}$

Value of gold in coin : value of silver in coin :: $3\frac{3}{4} : \frac{1}{4}$
:: 15 : 1 ;
Worth of gold : worth of silver : : 15 : 1.
$\therefore$ Gold and silver in coin are equal in weight, and there is *no copper*.

7. G.N.—Show that $(a+b+c)^4 - (b+c)^4 - (c+a)^4 - (a+b)^4 + a^4 + b^4 + c^4 = 12abc(a+b+c)$, applying the following theorem :—'Any algebraical expression which can be reduced to zero by supposing any letter or quantity in it to be zero, contains that letter or quantity as a factor.'

Let $a = 0$,
Then, $(a+b+c)^4 - (b+c)^4 - (c+a)^4 - (a+b)^4 + a^4 + b^4 + c^4$
$= (b+c)^4 - (b+c)^4 - c^4 - b^4 + b^4 + c^4$
$= 0$ ;
And, $12abc(a+b+c) = 0$ ;
Hence $a$ is a factor.

Similarly, by putting $b = 0$, and $c = 0$, we find that $b$ and $c$ are factors ;

Next, let $a + b + c = 0$ ;
Then, $(a+b+c)^4 - (b+c)^4 - (c+a)^4 - (a+b)^4 + a^4 + b^4 + c^4$
$= -(-a)^4 - (-b)^4 - (-c)^4 + a^4 + b^4 + c^4$
$= -a^4 - b^4 - c^4 + a^4 + b^4 + c^4$
$= 0$ ;
And, $12abc(a+b+c) = 0$.

Hence we have $abc(a+b+c)$ as a factor in the value of the expression ; and since this is of the same dimensions as the original expression, it is evident that there can be no other letters in the required value. We must now see if there be any *numerical* coefficient ; to determine this, let the expression = $Nabc(a+b+c)$, where N is an unknown number.

Now since this is true for all values of $a$, $b$, and $c$, suppose $a = b = c = 1$ ;
Then, $(a+b+c)^4 - (b+c)^4 - (c+a)^4 - (a+b)^4 + a^4 + b^4 + c^4$
$= 3^4 - 2^4 - 2^4 - 2^4 + 1^4 + 1^4 + 1^4$
$= 81 - 16 - 16 - 16 + 1 + 1 + 1$
$= 36$ ;
And, $N abc(a+b+c) = 3N$ ;
$3N = 36$
$\therefore N = 12$.

Hence the given expressions are equal.

9. BRITON.—A maiden went to market with some apples She met three boys. First boy took $\frac{1}{2}$ of what she had, and gave her 10 back. Second boy took $\frac{1}{3}$ of what she had left, and gave her 2 back. Third boy took $\frac{1}{2}$ of what she had left, and gave her 1 back. She had 12 left. How many had she at first ?

Let $x$ = No. of apples she had at first ;
Then, No. left after first sale = $\frac{x}{2} + 10$ ;
" " " " second " = $\frac{2}{3}\left(\frac{x}{2} + 10\right) + 2$
$= \frac{x+20}{3} + 2$
$= \frac{x+26}{3}$ ;
" " " " third " = $\frac{1}{2}\left(\frac{x+26}{3}\right) + 1$
$= \frac{x}{6} + \frac{13}{3} + 1$
$= \frac{x}{6} + \frac{16}{3}$

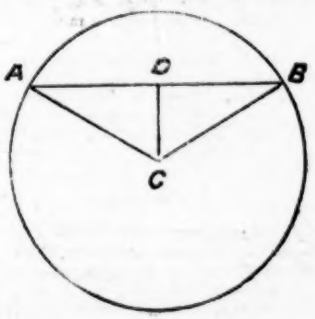
$\therefore \frac{x}{6} + \frac{16}{3} = 12$
$x + 32 = 72$
$x = 72 - 32$
$\therefore x = 40$.
$\therefore$ She had 40 apples at first.

## Mensuration.

1. SAMSON AGONISTES.—The wheels of a locomotive are $2\frac{1}{2}$ metres asunder, and the inner wheel describes the circumference of a circle whose radius is 120 metres ; find the difference of the lengths of the paths of the wheels, having given that the circumference of a circle equals 3·1416 times its diameter. (*Scholarship*, 1875.)

Path of inner wheel = (120 × 2 × 3·1416) metres
= (240 × 3·1416 metres) ;
" outer " = {(120 + 2½) × 2 × 3·1416} metres
= (245 × 3·1416) metres ;
$\therefore$ Difference of paths = {(245 − 240) × 3·1416} metres
= (5 × 3·1416) metres
= 15·708 metres.

2. WILLINGTONIAN.—The radius is 10 ft. ; the angle of the sector is 120° : find the area of the segment. (*Todhunter.*)




120° = ⅓ of 360°.
$\therefore$ Area of sector = ½(10² × 3·1416) sq. ft.
= ½ of 314·16 "
= 104·72 "

Angle ACD = 60°, angle ADC is a right angle, therefore angle CAD = 30°.

Triangle ACD is half an equilateral triangle ; wherefore area of triangle ABC = area of equilateral triangle with side equal to AC ;

$\therefore$ Area of triangle = (10² × ·433) sq ft.
= 43·3 sq. ft. ;
$\therefore$ Area of segment = (104·72 − 43·3) sq. ft.
= 61·42 sq. ft.

## General.

1. WAMBA.—I want 10,000 litres of $SH_2$ at 12°C and 600 m.m. pressure. How many grams of FeS is required for the purpose? What weight of HCl is required? And what weight of $FeCl_2$ is required?

Formula of re-action $FeS + 2HCl = FeCl^2 + H^2S$

Weights. $(56+32=88$ of FeS $+ 2(1+35\frac{1}{2}) = 73$ of HCl yield $(56+71=127)$ of $FeCl^2 + (2+32=34)$ of $H^2S$

Volumes. 34 grs. of $H^2S = 22{\cdot}4$ litres at 760 m.m. and 0°C.

∴ for 22·4 litres $H^2S$, 88 grs. FeS, 73 grs. HCl are needed, and 127 grs. $FeCl^2$ are formed;

(i) for 1 litre $H^2S$ $\frac{88}{22{\cdot}4}$ grs. FeS, $\frac{73}{22{\cdot}4}$ grs. HCl are needed, and $\frac{127}{22{\cdot}4}$ grs. $FeCl^2$ are formed.

Now 10,000 litres of gas at 12° C. and 600 m.m. must be turned into the equivalent number at 0° C. and 760 m.m.

273 volumes at 0° become 285 at 12°
285 ,, 12° ,, 273 at 0°
1 ,, ,, ,, $\frac{273}{285}$ ,,
10,000 ,, ,, ,, $\frac{273 \times 10{,}000}{285}$ at 0°.

And $\frac{273 \times 10000}{285}$ under pressure 600 become

$\frac{273 \times 10000 \times 600}{285}$ ,, 1 and

(ii) $\frac{273 \times 10000 \times 600}{285 \times 760}$ ,, 760.

It is required, therefore, to find out what weight of FeS and of HCl are required to yield $\frac{273 \times 10000 \times 600}{285 \times 760}$ litres of $H^2S$, and what weight of $FeCl^2$ is formed?

By (i) and (ii) we have that

for $\frac{273 \times 10000 \times 600}{285 \times 760}$ lit. $H^2S$ $\frac{88 \times 273 \times 10000 \times 600}{22{\cdot}4 \times 285 \times 760}$ grs. FeS,

$\frac{73 \times 273 \times 10000 \times 600}{22{\cdot}4 \times 285 \times 760}$ grs. HCl are needed, and

$\frac{127 \times 273 \times 10000 \times 600}{22{\cdot}4 \times 285 \times 760}$ grs. $FeCl^2$ are formed.

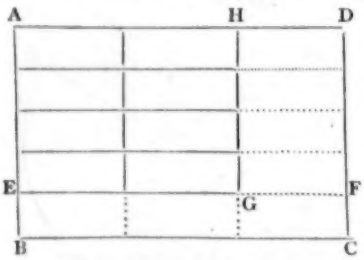
2. W. PEATFIELD.—Your solution is simpler.

3. M. O.—You will find the solution of your query in our issue for March, 1882.

4. A-VANT-JOUR.—'Show by a diagram how you would work a sum in Multiplication of Vulgar Fractions.'

Multiply $\frac{4}{5}$ by $\frac{2}{3}$.

This means, take two-thirds of the fraction four-fifths.




AEFD $= \frac{4}{5}$ of the figure ABCD,
AEGH $= \frac{2}{3}$ of AEFD
$= \frac{2}{3}$ of $\frac{4}{5}$ of the figure ABCD
$= \frac{8}{15}$ of the figure ABCD.

This demonstrates the rule for the Multiplication of Vulgar Fractions.

5. H. H.—Your query is solved in our issue for April, 1882.

6. ANOMALY.—Query No. 12 (Arithmetic) in our last issue is not a good question, as it is evident that there must only be as many boys as men, and therefore 2 boys must remain idle for 6 days. We obtain from the question as it is given that 1 man and 1 boy can do $\frac{1}{12}$ of the work in one day, and 1 man alone can do the same quantity in the same time.

7. CARN BREA.—We believe our solution i correct. Please give the source from which you obtained the question. You will find the solution of the other query in our issue for July, 1882.

8. 'MOST IGNORANT' asks in connection with the Latin lessons, now being given in this paper, for directions as to pronunciation. It is probably not known how the language was pronounced, nor, being now unspoken, is it a matter of any importance. A few years ago an effort was made to introduce into our schools what was hoped by some to be a little less unlike what was spoken in Cicero's time; but the method was rejected by some of our largest and best schools, and found but very little favour at Cambridge. In this method all the vowels were pronounced as they are in modern Italian—the 'v' was sounded like 'w' and every 'c' as a 'k' (in the old method 'c' became 'k' before 'a,' 'o,' and 'u'). The three words, then, of Cæsar's celebrated speech, 'veni, vidi, vici,' which used to be read 'veenigh, vighdigh, vighsigh,' are rendered thus, 'wayny, weedy, weeky.' In Lesson XVII. the general rules as to lengths of vowels and diphthongs will be given, and in future all doubtful syllables will be marked thus: 'oppĭdum,' which has the accent on the 'op.' The diphthong 'æ' in hædus (sometimes printed separately) is pronounced as the 'æ' in Cæsar.

9. INQUIRY.—Write to the Registrar of the University for the syllabus. It will be forwarded post free.

10. HERNE HILL asks for the working of the following question in G.C.M., viz.,

$x^7 - 17x^6 + 26x^5 + 5x^4 - 11x^3 - 10x^2 + 10x + 10$

and $3x^6 + 12x^7 - 18x^5 - 15x^4 - 14x^4 + 43x^3 - 115x^2 - 71x + 100$

The expression being homogeneous with respect to $x$ and unity, the coefficients may be detached; but the coefficients are likely to become very large by the introduction of factors to render division without fractions possible.

'Herne Hill' will find that if he writes the expressions in an inverse order the coefficients will be somewhat smaller.

It is often as well in finding the G.C.M. of these long expressions to test if they have a binomial common factor, which by examining the first and last coefficients of either expression can generally be reduced to very few possible ones, *e.g.*, in this case the only possible binomial factors are $x \pm 1$, $x \pm 10$, $x \pm 2$, and $x \pm 5$, and by the well known fact that the remainder after dividing by $x+1$ is the same function of $(-1)$ as the dividend is of $x$: it is a very short operation to test, *e.g.*, after dividing the first expression by $x+1$ the remainder will be $(-1)^7 - 17(-1)^6 + 26(-1)^5$, etc. In this way we should discover that these two expressions have no common binomial factor. Of course, if a binomial factor occurred in the one and not in the other we should immediately reduce the expression by that factor, that is, divide it and treat with the quotient only.

If 'Herne Hill' will take any expression, however simple, and multiply it first by one expression and then another, and then proceed in the ordinary way to find the G.C.M., he will be astonished to find how large, in the majority of cases, the coefficients become. The difficulty is considerably increased when the expressions are not homogeneous or contain more than two symbols.

The writer of this answer has only reduced the smaller of these expressions by one term and the larger by three, and the coefficients contain five figures, and the first term of the next line of working will have to be the L.C.M. of 7700 and 73,933, which having no common factor will introduce a coefficient of ten figures, viz., 16,457 × 73,933.

11. MUSIC.—Your query is solved in our issue for July, 1882.

12. BUNGAY.—In the sentence, 'No one was present *but* me, the word *but* is a preposition, governing the pronoun *me*, in the objective case. It is a preposition whenever it means *except*. It would be a *conjunction* in the sentence, 'He does not draw well at present, *but* he will improve in time.' It will be noticed that in this sentence the word *but* cannot be replaced by *except*, as was possible in the first sentence.

13. QUI.—The original meaning of the word *handsome* is, *what falls readily to the hand;* and hence, *convenient*, *suitable*, *becoming*, and lastly, *good-looking*. The derivation is from the word *hand* and the Teutonic suffix *some*, which is added to verbs and adjectives to denote the presence of the quality indicated, as in *quarrelsome*, *tiresome*, *wholesome*, etc.

14. IRONCLAD.—A circular wind blowing in an opposite direction.

15. YUEB.—State what subjects you wish us to recommend books for. The answers are now appearing in our own columns.

## Science Notes.

DISCOVERY OF RARE FOSSIL REMAINS.—A recent paper in the *Geological Magazine* has especial interest for those readers who are attracted by the questions and problems of palæontology. In it Mr. E. T. Newton gives an account of some discoveries made by Mr. Clement Reid in the Norfolk deposit, which is known as the Mundesley River Bed. He considers that he has come upon undoubted bones of a bird of the genus Colympus, a remarkably rare occurrence in the Quaternary deposits of this country. The bones are believed to represent the red-throated diver (C. Septentrionalis), and are the first instance on record of the discovery of remains of this genus in England.

* * * * *

STORAGE OF ENERGY BY PLANTS.—That the vegetable kingdom is the great accumulator of energy as well as of material has long been realised. As no other organism than the plant can build up its substance from the inorganic materials found in air, earth, and water, and so transform unorganised to living matter, so no other has the power of taking up radiant energy and transforming it to potential energy to anything like the extent that the plant has. Some important researches into this subject have been made lately by M. Timiriazeff, and communicated by him to the Paris Academy of Sciences. He directed his attention, at the same time, largely to the distribution of energy in the solar spectrum, and endeavoured to find a quantitative relation between the solar energy absorbed by the chlorophyll and the potential energy that was stored in the formed products resulting therefrom. His conclusions are that the leaf can transform into useful work as much as forty per cent. of the energy absorbed by it. This is the more striking when we find as we do that the most economical arrangement possible with our highly-finished steam-engines will only allow about one-tenth of the energy supplied in fuel to re-appear as work.

* * * * *

THE GREAT COMET OF 1882.—We hear from the Cape of Good Hope that a photograph was successfully taken of the tail of the comet, and with it fifty stars that were visible through the tail. The successful operator was Dr. Gill. In his process he so arranged his plate that by means of clockwork it was kept counteracting the motion of the earth. The exposure necessary for the photograph was 140 minutes.

* * * * *

WRITING IN SCHOOLS IN ITS INFLUENCE ON THE SIGHT AND ON THE SPINE.—Recently a commission was appointed to investigate the effect of slanting writing in the schools of Wurtemberg. More attention was formerly given in the schools to the subject of writing than is now possible under the altered conditions of education, but as apparently much mischief to both eyes and back may follow improper modes, it is not uninteresting to see the report of this commission and the discussions that have followed upon its inquiries. In writing or drawing with straight lines, the visual axes move by preference in two general directions, either upwards and downwards, or from side to side, rather than diagonally. The report says that 93 per cent. of the children who were under observation made their down strokes in a direction nearly at right angles with the base line of the triangle, which is formed by the line joining the centres of rotation of the two eyes and the prolongation of the converging visual axes. For the writing, then, to be inclined at the proper angle, the best position for the book or paper is one tilted towards the left. If a child endeavours to write with his book exactly in front of him at right angles to his person, he generally turns his head towards the right and twists himself round, bringing his eyes nearer the paper, and the left one of course nearer than the right. The use of the ordinary slate in schools also assists the injury that this practice involves. Its surface being shiny, and the contrast with the letters upon it being but feeble, the eyes are compelled to approach it more closely, and consequently excessive accommodation and convergence of the axes are necessitated. These almost inevitably bring on myopia, or short-sight. This last evil has been remedied in German schools by the introduction of artificial white slates and special pencils for use with them. The former one demands the careful attention of all who are engaged in teaching the use of the pen.

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THE ELECTRIC LIGHT IN MINES.—The dangers said to attach to the use of the electric light in mines appear to be entirely got rid of by a form of safety-lamp introduced by M. Mangin. It consists of a Swan incandescent lamp, which is immersed in a glass globe containing water. The light from this is intensified by a copper casing, which is silvered inside, and by an arrangement of strong lenses. Its superiority over many other forms was demonstrated in a trial made by the inventor. This consisted in placing it in the middle of a balloon filled with hydrogen gas, in which position it continued to give its light, and did not in any way affect the highly inflammable material surrounding it.

* * * * *

PHYSIOLOGY AT THE UNIVERSITIES.—The University of Oxford has recently done honour to itself by electing to the vacant chair of physiology Professor J. Burdon Sanderson, so long at the head of this subject at University College, London. Following up this step, the same body has formed a scheme for the teaching of the subject at Oxford, which involves the outlay of several thousand pounds in laboratories, museum, scientific apparatus, etc. At Cambridge, under the new statutes, the University is required to establish a chair in the same subject, and the necessary steps having been taken, a professor will be appointed next term. Public opinion points to the election to the chair, when founded, of the talented Secretary of Royal Society, Dr. Michael Foster, under whose supervision the study of the science has already for many years taken a high position in the University curriculum. At University College, London, the vacancy caused by the removal of Dr. Burdon Sanderson has been filled by the appointment of Professor E. A. Schäfer, the editor of the new edition of Dr. Quain's 'Anatomy.'

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THE CONSERVATION OF SOLAR ENERGY.—Any work by so noted a physicist as Dr. C. W. Siemens

commands the attention of the scientific world. It is, therefore, gratifying to know that the paper on the conservation of solar energy which he read before the Royal Society is shortly to appear in the form of an octavo volume. Besides his original paper, the work will contain the discussion on the subject which has been carried on in *Nature* and before the Paris Academy of Sciences.

* * * * *

THE ELECTRIC LIGHT IN NEW YORK.—The United States being the birthplace of Edison and the scene of his inventive triumphs, it is naturally there that we expect to find the most important of all in active operation before it reaches ourselves. The Edison Electric Light Company seem to have solved the difficulties connected with the distribution of the light and its supply to dwelling-houses. On their circuits at New York they have already 300 houses, and in these no less than 6,000 lamps. The competition with gas so long threatened has there taken place; the houses are supplied with meters, which are capable of correctly registering the amount of electricity supplied. The charges to consumers are about the same as those for an equal amount of illumination by gas, while the advantages attending the use of the light, in point of cleanliness, healthiness, and safety, are very great.

* * * * *

NEW MATERIAL FOR FLOOR-CLOTH.—A very interesting application of papier-maché has been introduced in America. It will form a substitute for mattings, carpets, oil-cloth, etc., having in its favour such important recommendations as durability and cheapness, while it is fairly simple to apply it. To put it down, the floor must be thoroughly cleansed and the holes and cracks filled up with a paper-putty. The material used as a paste is made of wheat-flour, water, and ground alum. With this the floor is coated uniformly, and upon it a thickness of hardware paper is evenly placed. Another layer of paste and paper can be added if necessary. On this becoming perfectly dry another surface of paste is added, and on this a layer of wall-paper, of whatever pattern is approved. This, when dry, is covered with several coats of sizing, made by dissolving white glue in water. This completes the process, and the material so compounded is described as being pleasant in appearance, durable, and inexpensive.

* * * * *

SINCE the days of Bacon the scientific study of nature has grown in importance and value, until the discoveries in this field stamp a mark on the present age. The investigations nowadays, however, instead of being, as in early times, the monopoly of a few, are growing in popular favour, and since in this, as in other pursuits, man requires instruments to aid him in his researches, various endeavours have been made from time to time to bring those that were necessary within the reach of all. Amongst those instruments which have particularly aided in the pursuit of natural science, the microscope takes a very high place. This point the proprietors of the Scientific Instrument Agency have fully recognised, and have produced an instrument—the International Microscope—which at the price can hardly be excelled, or even equalled. We have ourselves had an opportunity of examining its make and capabilities, and from our own observation would recommend those desirous of investing in a microscope to send for the 'International.' We feel they will not be disappointed, especially since the Scientific Agency, with full confidence in this speciality of theirs, are willing to send the same on trial for ten days, to be returned and the money reimbursed should the purchaser not be satisfied.

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# Christmas Certificate Examination, 1882.

MALE AND FEMALE CANDIDATES (FIRST YEAR).

## Languages.

FOUR *hours allowed for this Paper for Male Candidates;* THREE *hours for Female Candidates.*

*Male* Candidates may answer questions in *two* Languages, *Female* Candidates in *one* only.

N.B.—German words must be written in English characters.

### SECTION I.—LATIN.

1. Translate into English :—

Acriter in eo loco pugnatum est. Hostes impeditos nostri in flumine aggressi magnum eorum numerum occiderunt: per eorum corpora reliquos audacissime transire conantes multitudine telorum repulerunt: primos qui transierant equitatu circumventos interfecerunt. Hostes, ubi et de expugnando oppido et de flumine transeundo spem se fefellisse intellexerunt, neque nostros in locum iniquiorem progredi pugnandi causâ viderunt, atque ipsos res frumentaria deficere cœpit, concilio convocato, constituerunt optimum esse domum suam quemque reverti.

Parse aggressi, conantes, fefellisse, repulerunt, progredi, cœpit, intellexerunt, reverti, se, quemque, iniquiorem, transierant.

Give an example from the above passage of the ablative absolute construction.

2. Translate into English :—

Ad hæc Cæsar respondit: se, consuetudine sua quam* merito eorum civitatem conservaturum, si prius quam murum aries attigisset se dedidissent: sed deditionis nullam esse conditionem nisi armis traditis. Se id, quod in Nerviis fecisset, facturum, finitimisque imperaturum ne quam§ dediticiis populi Romani injuriam inferrent. Re nuntiatâ ad suos, quæ imperarentur facere dixerunt. Armorum magnâ multitudine de muro in fossam, quæ erat ante oppidum, jactâ, sic ut prope summam muri aggerisque altitudinem acervi armorum adæquarent, et tamen circiter parte tertiâ, ut postea perspectum est, celatâ atque in oppido retentâ, portis patefactis, eo die pace sunt usi.

Parse conservaturum, jactâ, quam,* quam,§ prope, sic, eorum, attigisset, eo die pace sunt usi.

Describe the 'aries,' and explain the construction and use of the 'vinea' and 'testudo' in Roman warfare.

Explain the subjunctive moods in this passage.

1. They fought (lit., it was fought) sharply in that place. Our men at the river having attacked the cumbered enemy, killed a great number of them. The rest of them, trying very boldly to cross by means of the bodies of those who had been killed, they drove back with a shower of weapons. The first who had crossed they slew, having been flanked by the cavalry. The enemy, when they perceived that they were disappointed, both with regard to storming the town and crossing the river, and saw that our men were proceeding to a no less favourable place for the sake of fighting, and provisions began to fail them, having called a council, determined it to be best that each one should return to his own home.

*aggressi* is a deponent verb of 3rd conj. perf. part., m. pl. n. to agree with hostes; aggredior, aggredi, aggressus.
*conantes* is a dep. verb of the 1st conj. pres. part., m. pl. ac. to agree with reliquos; conor, conari, conatus.

*fefellisse* is a verb of 3rd conj., inf. perf. depend. on intellexerunt; fallo, fallere, fefelli, falsum.
*repulerunt* is a verb of 3rd conj., ind. perf., 3rd pl., to agree with *our men*; repello, repellere, repuli, repulsum.
*progredi* is a dep. verb of 3rd conj., inf. pr., depend. on viderunt; progredior, progredi, progressus.
*cæpit* is a defective verb, ind., perf., 3rd sing., to agree with res frumentaria; cœpi, cœpisse.
*intellexerunt* is a verb of 3rd conj., infin. perf., 3rd plur., to agree with hostes; intelligo, intelligere, intellexi, intellectum.
*reverti* is a verb deponent of 3rd conj., inf. pres., depend. on constituerunt.
*se* is a reflexive pronoun from sui c. gen. pl. acc. obj. of fefellisse.
*quemque* is an indef. pron. from quisque, m. s. acc., sub. of inf. mood reverti.
*iniquiorem* is a comp. adj. from iniquior, m. s. ac., to agree with locum.
*transierant* is an irreg. verb of 4th conj., ind., plup. 3rd pl., to agree with qui; transeo, transire, transii, transitum.
'Concilio convocato' is an ablative absolute.

2. To these things Cæsar replied that he, according to his custom, should preserve their state as far as they deserved it, if they gave themselves up before the battering-ram touched the wall, but that there could be no condition of surrender unless the arms were given up. That he, as he had done in the case of the Nervii, would manage and order their neighbours to do no injury to those who had surrendered to the Roman people. The thing having been reported by the Nervii to their own people, they told them to do what was commanded. A great number of arms having been thrown from the wall into the ditch which was before the town, to such an extent that the heaps of arms nearly reached the top of the wall and the height of the mound, and nevertheless a third part, as was afterwards discovered, having been concealed and retained within the town. The gates having been thrown open, they experienced peace on that day.

*conservaturum* is a verb of 1st conj., inf., fut., depend on respondit.
*jactâ*—p. pass. part. from jacio, f. s. ab. to agree with magnitudine, abl. abs.; jacio, jacere, jeci, jactum.
*quam* is an adv. modifying merito.
*quam* is an indefinite pron. from quis (for aliquis), f. s. ac., to agree with injuriam.
*prope* is an adv. modifying adæquarent.
*sic* is a conjunction coupling the sentences.
*eorum* is a dem. pron., m. pl. gen. depend. on civitatem.
*attigisset* is a verb of 3rd conj., sub. mood, plup. tense, 3rd sing., to agree with aries.
*eo die*—ablative of time.
*pace*—ablative after usi.
*usi sunt*—dep. verb of 3rd, ind. pf. 3rd pl., to agree with they; utor, uti, usus.

'Aries' was an engine with horns of iron, like a ram's head, with which the Romans knocked down walls.
The 'vinea' was an engine of war made of timber and hurdles, under which, in assault, they came safely under the walls of a town, and so scaled them.
The 'testudo' was formed by a body of men placing their shields over their heads, as close to one another as possible, and so moving forward to the attack of a town.
'Attigisset' and 'dedidissent' are in the subjunctive mood because the sentence is conditional.
'Fecisset' is in subjunctive because it occurs in oratio obliqua.
'Imperarentur' is subjunctive because it is a verb of the relative clause in which the relative is used in a partitive sense.
'Inferrent' is subjunctive after imperaturum.
'Adæquarent' is in a consequent clause.

## SECTION II.

Translate into Latin:—

(*a*) She went to Rome yesterday.
He said that he would go there to-morrow.
My mother and I are very poor.
We live upon (vescor) bread and water.
I am afraid he may come.
I am afraid he may not come.
I work that I may live.
They worked that they might live.
He was born (nascor) at Sparta, and she at Carthage (Carthago).

(*b*) At-the-approach-of evening Cæsar ordered the gates to be closed, and the soldiers to go out of the town, lest the townsfolk should receive any injury from the soldiers in the night.

(*c*) On that river there was a bridge: there he places a garrison, and on another part of the river he leaves a lieutenant with six cohorts and orders him to fortify a camp.

(*d*) The Treviri, when they saw our camp filled with a multitude of the enemy, our legions (hard) pressed and almost surrounded, cavalry, slingers, Numidians, scattered and flying in every direction,—despairing of our cause, returned home.

(*a*) Heri Romam ivit.
Dixit se ibi cras iturum esse.
Ego et mea mater pauperrimi sumus.
Vescimur pane et aqua.
Vereor ne veniat.
Vereor ut veniat.
Laboro ut vivam.
Laboraverunt ut viverent.
Spartæ is natus est, et ea nata est Carthagine.

(*b*) Ut vesperascit, Cæsar portas claudi jussit et milites ex urbe excedere ne oppidani quam a militibus nocte injuriam acciperent.

(*c*) In eo flumine pons erat: eo præsidium ponit et fluminis in alia parte legatum relinquit cum sex cohortibus et ut castra muniat jubet.

(*d*) Treviri, quum castra hostium multitudine repleta viderunt, nostras legiones oppressas et prope circumventas, equites, funditores, Numidas, fusos et omnes partes fugientes—de nostra causa desperantes, domum redierunt.

## SECTION III.

1. Give the present and perfect infinitive, the first person singular and third plural of the perfect tense indicative and subjunctive, in the active voice—and the participles, active and passive, of the following verbs: jubeo, fodio, veneo, venio, fero, parco, disco, dico, gigno, sisto.

2. What general rules can you give for determining the genders of nouns in Latin?

3. Write out the accusative, genitive, and dative cases, singular and plural, of each of the following pronouns: idem, iste, aliquis, qui, qualis, se.

4. Name and give examples of the different kinds of Latin adverbs, and show how they are generally formed from adjectives. Compare *bene*, *facile*, *magis*, *diu*, *potius*, *satis*, and *sæpe*.

5. State the rules (and illustrate them by examples) for the agreement of (*a*) the verb with its subject, (*b*) the adjective with its substantive, (*c*) the relative with its antecedent.

## ANSWERS.

1. Writing the forms in order, jubere, jussisse, jussi, jusserunt, jusserim, jusserint, jubens, jussurus, jussus, jubendus; fodere, fodisse, fodi, foderunt, foderim, foderint, fodiens, fossurus, fossus, fodiendus [some grammarians doubt the existence of these perfect tenses in pure Latin]; venire, veniisse, venii, venierunt, venierim, venierint, veniens, veniturus, venitus, veneundus; venire, venisse, veni, venerunt, venerim, venerint, veniens, venturus, ventus, veniendus; ferre, tulisse, tuli, tulerunt, tulerim, tulerint, ferens, laturus, Latus, ferendus; parcere, pepercisse, peperci, pepercerunt, pepercerim, pepercerint, parcens, parcitus and parsurus, parcitus and parsus, parcendus; discere, didicisse, didici, didicerunt, didicerim, didicerint, discens, none, none, discendus; dicere, dixisse, dixi, dixerunt, dixerim, dixerint, dicens, dicturus, dictus, dicendus; gignere, genuisse, genui, genuerunt, genuerim, genuerint, gignens, geniturus, genitus, gignendus; sistere, stitisse, stiti, stiterunt, stiterim, stiterint, sistens, staturus, status, sistendus,

2. Generally all males and names of rivers are masculine.
All females, names of countries and of trees, aré feminine.
With respect to other nouns, the gender is generally remembered by the nom. termination.
E. and A. nouns are feminine.
O. ,, U. ,, ,, masculine.
Of the I declension, those ending in vowels, except o, are neut.
Nouns in o (except do, go, io, which are fem.) and nouns in o, er, or os, es, (increasing in gen. case) are masc.
Nouns in es (not increasing in gen. case), in ys, s (preceded by a consonant), and us, increasing long in gen., are feminine.
Nouns in us, (increasing short), c, t, l, ar, and ur, are neut.

| | M. | F. | N. |
|---|---|---|---|
| Sing. Ac. | eundem | eandem | idem |
| G. | ejus | | |
| D. | ei | | |
| Pl. Ac. | eosdem | easdem | eadem |
| G. | eorundem | earundem | eorundem |
| D. | eisdem or iisdem | | |
| | istum | istam | istud |
| | istius | | |
| | isti | | |
| | istos | istas | ista |
| | istorum | istarum | istorum |
| | istis | | |
| | aliquem | aliquam | aliquid and quod |
| | alicujus | | |
| | alicui | | |
| | aliquos | aliquas | aliqua |
| | aliquorum | aliquarum | aliquorum |
| | aliquibus or | aliqueis | |
| | quem | quam | quod |
| | cujus | | |
| | cui | | |
| | quos | quas | quæ |
| | quorum | quarum | quorum |
| | quibus or | queis | |
| | qualem | | quale |
| | qualis | | |
| | quali | | |
| | quales | | qualia |
| | qualium | | |
| | qualibus | | |
| | se | | |
| | sui | | |
| | sibi | | |

Plural same as sing.

Adverbs are

(*a*) Simple, *i.e.*, not derived from any known root in the language.

(*b*) Derivative.

(1) Ending in e ter (iter), derived from adj. and part. *e.g.*, brevis, breviter ; ornatus, ornate.

(2) Ending in ere or re, derived from adj. in er. *e.g.*, liber, libere ; æger, ægre.

(3) Ending in o, from adjectives in us, a, um. *e.g.*, continuo, raro.

(4) Ending in im, derived from perf. part., *e.g.*, statim.

| | | |
|---|---|---|
| bene | melius | optime |
| facile | facilius | facillime |
| magis | majus | maxime |
| diu | diutius | diutissime |
| | potius | potissime |
| satis | satius | satissime |
| sæpe | sæpius | sapissime |

5. The verb agrees with its subject in number and person, *e.g.*, puer currit.

An adjective agrees with the noun it qualifies in gender, number, and case, *e.g.*, bona puella curret.

A relative agrees with its antecedent in number and gender, but not necessarily in case, *e.g.*, puer, quem pater amat, bonus est.

## Greek.

### SECTION I.

1. Translate into English :—

"Ὅσους μὲν ἂν αἰσθάνοιτο ἐπιόρκους καὶ ἀδίκους, ὡς εὖ ὡπλισμένους ἐφοβεῖτο, τοῖς δὲ ὁσίοις καὶ ἀληθείαν ἀσκοῦσιν ὡς ἀνάνδροις ἐπειρᾶτο χρῆσθαι. Ὥσπερ δέ τις ἀγάλλεται ἐπὶ θεοσεβείᾳ καὶ ἀληθείᾳ καὶ δικαιότητι οὕτω Μένων ἠγάλλετο τῷ ἐξαπατᾶν δύνασθαι, τῷ πλάσασθαι ψευδῆ, τῷ φίλους διαγελᾶν· τὸν δὲ μὴ πανοῦργον τῶν ἀπαιδεύτων ἐνόμιζεν εἶναι. Καὶ παρ' οἷς μὲν ἐπεχείρει πρωτεύειν φιλίᾳ, διαβάλλων τοὺς πρώτους, τούτους ᾤετο δεῖν κτήσασθαι. Τὸ δὲ πειθομένους τοῖς στρατιώταις παρέχεσθαι, ἐκ τοῦ συναδικεῖν αὐτοῖς ἐμηχανᾶτο.

2. Translate into English :—

„ Πρῶτον μὲν γὰρ καὶ μέγιστον, οἱ θεῶν ὅρκοι ἡμᾶς κωλύουσι πολεμίους εἶναι ἀλλήλοις· ὅστις δὲ τούτων σύνοιδεν αὐτῷ παρημεληκὼς, τοῦτον ἐγὼ οὔποτ' ἂν εὐδαιμονίσαιμι· Τῶν γὰρ θεῶν πόλεμον οὐκ οἶδα οὔτ' ἀπὸ ποίου ἂν τάχους οὔτε ὅποι ἂν τις φεύγων ἀποφύγοι, οὔτ' εἰς ποῖον ἂν σκότος ἀποδραίη, οὗθ' ὅπως ἂν εἰς ἐχυρὸν χωρίον ἀποσταίη. Πάντη γὰρ πάντα τοῖς θεοῖς ὕποχα, καὶ πανταχῇ πάντων ἴσον οἱ θεοὶ κρατοῦσι."

Parse :—ὡπλισμένους, ἀνάνδροις, τίς, τω, ᾤετο, κτήσασθαι, τὸ, πειθομένους, αὐτοῖς.—παρημεληκὼς, τάχους, ἀποδραίη, πάντη, πάντων, and explain the force of the genitive in οἱ θεῶν ὅρκοι.

1. As many as he perceived to be breakers of oaths, and unjust, he feared as men well armed. But the holy, and those practising truth, he endeavoured to use as cowards. And just as one rejoices at piety, and truth, and righteousness, so Menon rejoiced at being able to deceive, at composing lies, at laughing at friends, and he deemed one who was not knavish to belong to the uneducated, and where he undertook to be first friends with any he thought it necessary to win them over by slandering the best of them (or their chiefs). But the rendering the soldiers obedient, this he effected by doing evil with them.

2. For first and greatest the oaths by the gods forbid us to be enemies one to another, whosoever is conscious within himself of having neglected them (this man I should never deem happy). For war with the gods I know not, either whence or whither one flying could quickly fly, nor into what darkness he could escape, nor how he could depart to a place of safety. For everything everywhere is under the control of the gods, and everywhere equally do the gods rule over all things.

ὡπλισμένους is a p. pass. part. from ὁπλίζω, m. pl. ac. to agree with επιορκους, etc.

ανανδροις is an adj. from ανανδρος — δρον, m. pl. dative, coupled by ὡς to ὁσίοις, etc.

τις is an indef. pron. c. s. n., subject ἀγάλλεται.

τῷ is the art. n. s. dat. agreeing with ἐξαπατᾶν.

(N.B.—ἐξαπατᾶν would now be printed without the ι subscript.)

ᾤετο is a verb, mid. ind. imp. 3 sing. to agree with Menon.

κτήσασθαι is a verb, mid. 1 aor. inf. depend. on δεῖν.

τὸ n. art. used to make inf. mood παρέχεσθαι, a verbal noun.

πειθομένους, pr. part. mid. m. pl. acc. to agree with στρατιώτας.

αυτοις is dem. pr. m. pl. dat. governed by συν in συναδικεῖν.

παρημελεκὼς is a pf. ac. part. from παραμελέω, m. s. n. to agree with "he."

τάχους is gen. sing. from ταχος, used adverbially.

ἀποδραίη is the opt. 2 aor. 3 sing. from ἀποδιδράσκω.

πάντη is an adverb, mod. εἰσι understood.

πάντων is an adj. gen. pl. gov. by κρατουσι.

θεῶν is a limiting genitive, not all oaths, but oaths by the gods.

### SECTION II.

Translate into Greek :—

(*a*) The enemy (πολέμιος, plur.) having done (πράσσω) these things went away (ἀπέρχομαι).

(*b*) No one is free (ἐλεύθερος) who does not command (κρατέω) himself (gen.).

(*c*) Honourable war is preferable (αἱρετος, in comp. deg.) to disgraceful peace.

(*d*) Socrates said, 'Other men live (ζάω) in order that they may eat (ἐσθίω), but I eat in order that I may live.'

(*e*) And when Proxenus said, 'I myself am he whom you are looking for,' the man said thus : 'A. and B. being faithful to Cyrus, and friendly (εὐνους) to you (plur.), have sent me, and they strongly-urge (κελεύω) you to send a guard-of-soldiers (φυλακὴ) to-take-possession-of (ἐπὶ) the bridge (γέφυρα) over the river Tigris, as Tissaphernes intends to break it down (λύω) in order that you may not cross over (διαβαίνω).'

(*f*) A good man is a public blessing.

(*g*) Power is, as you say, a good thing.

(*a*) Οἱ πολέμιοι, πράξαντες ταῦτα, ἀπῆρχοντο.

(*b*) Οὔτις ἐλεύθερός ἐστι ὃς οὐχ ἑαυτοῦ κρατεῖ.

(*c*) ὁ καλὸς πόλεμος αἱρετώτερός ἐστι τῆ αἴσχρᾳ εἰρήνῃ.

(*d*) Σωκράτης ἔλεγε, ἄλλοι ζῶσι ἵνα ἔσθίωσι ἀλλὰ ἐγὼ ἐσθίω ἵνα ζῶ.

(*e*) ὅτε δὲ Πρόξενος εἶπε, αὐτὸς εἰμι ὃν ζητεῖτε, ὁ ἀνὴρ ἔλεγε τοῦτο Α καὶ Β Κυρῳ πιστοὶ, καὶ ὑμῖν εὖνοι, ἐμε ἀπέστειλαν οὗτοι δέ σε κελεύουσι ἀποστέλλειν φυλακὴν ἐπὶ τὴν ὑπερ τοῦ ποταμοῦ Τίγριδος γέφυραν, ὡς Τισσαφέρνης ἐν νῷ ἔχει, αὐτὴν λύειν ἵνα μὴ διαβαίνητε.

(*f*) ἀνὴρ ἀγαθὸς ἐστι ἀγαθὸν δημόσιον.

(*g*) ἡ δύναμις ἐστι, ὡς λέγεις, ἀγαθόν.

### SECTION III.

1. Decline θήρ, σῶμα, γυνή—τυφθείς, ἡδύς, ἀληθής.

2. Write out the first aorist and the perfect tense indicative active and passive of γράφω and δηλόω, and show how these tenses are formed.

3. Decline οὗτος, ἐγώ, τοσοῦτος, σύ.

4. Give the force of each of the following prepositions followed by the genitive, dative, and accusative cases, respectively: παρά, πρός, ὑπό, περί.

5. Write down, with their meanings in English, as many Greek adverbs of *place* as you can remember. What terminations respectively indicate (*a*) rest in a place, (*b*) direction towards a place, (*c*) direction from a place.

| | | | |
|---|---|---|---|
| N.V. | θήρ | σῶμα | γυνή, V. γύναι |
| Ac. | θηρά | σῶμα | γυναικά |
| G. | θηρός | σώματος | γυναικός |
| D. | θηρί | σώματι | γυναικί |
| N.V. | θῆρες | σώματα | γυναῖκες |
| Ac. | θῆρας | σώματα | γυναῖκας |
| G. | θηρῶν | σωμάτων | γυναικῶν |
| D. | θηρσί | σώμασι | γυναιξί |
| N.V.A. | θῆρε | σώματε | γύναικε |
| G.D. | θηροῖν | σωμάτοιν | γυναικοῖν |
| N.V. | τυφθείς | τυφθεῖσα | τυφθέν |
| Ac. | τυφθέντα | τυφθεῖσαν | τυφθέν |
| G. | τυφθέντος | τυφθείσης | τυφθέντος |
| D. | τυφθέντι | τυφθείσῃ | τυφθέντι |
| N.V. | τυφθέντες | τυφθεῖσαι | τυφθέντα |
| Ac. | τυφθέντας | τυφθείσας | τυφθέντα |
| G. | τυφθέντων | τυφθεισῶν | τυφθέντων |
| D. | τυφθεῖσι | τυφθείσαις | τυφθεῖσι |
| N.V.A. | τυφθέντε | τυφθείσα | τυφθέντε |
| G.D. | τυφθέντοιν | τυφθείσαιν | τυφθέντοιν |
| N.V. | ἡδύς | ἡδεῖα | ἡδύ |
| Ac. | ἡδύν | ἡδεῖαν | ἡδύ |
| G. | ἡδέος | ἡδείας | ἡδέος |
| D. | ἡδεῖ | ἡδείᾳ | ἡδεῖ |
| N.V. | ἡδεῖς | ἡδεῖαι | ἡδέα |
| Ac. | ἡδεῖς | ἡδείας | ἡδέα |
| G. | ἡδέων | ἡδειῶν | ἡδέων |
| D. | ἡδέσι | ἡδείαις | ἡδέσι |
| N.V.A. | ἡδέε | ἡδεία | ἡδέε |
| G.D. | ἡδέοιν | ἡδείαιν | ἡδέοιν |

| | | M. & F. | N. |
|---|---|---|---|
| Sing. | N.V. | ἀληθής | ἀληθές |
| | Ac. | (ἀληθέα) ἀληθῆ | ἀληθες |
| | G. | (ἀληθεος) ἀληθοῦς | |
| | D. | (ἀληθεϊ) ἀληθεῖ | |
| Plur. | N.V. | (ἀληθέες) ἀληθεῖς | (ἀληθέα) ἀληθῆ |
| | Ac. | (ἀληθέας) ἀληθεῖς | (ἀληθέα) ἀληθῆ |
| | G. | (ἀληθέων) ἀληθῶν | |
| | D. | ἀληθέσι | |
| Dual. | N.V.A. | (ἀληθέε) ἀληθῆ | |
| | G.D. | (ἀληθέοιν) ἀληθοῖν | |

| | | | |
|---|---|---|---|
| 2. | S. | ἔγραψα | ἔγραψας | ἔγραψε |
| | D. | | ἐγράψατον | ἐγραψάτην |
| | P. | ἐγράψαμεν | ἐγράψατε | ἔγραψαν |
| | | ἐγράφθην | ἐγράφθης | ἐγράφθη |
| | | | ἐγράφθητον | ἐγραφθήτην |
| | | ἐγράφθημεν | ἐγράφθητε | ἐγράφθησαν |
| | | γεγράφηκα | γεγράφηκας | γεγράφηκε |
| | | | γεγραφήκατον | γεγραφήκατον |
| | | γεγραφήκαμεν | γεγραφήκατε | γεγραφήκασι |
| | | γέγραμμαι | γέγραψαι | γέγραπται |
| | | γεγράμμεθον | γέγραφθον | γέγραφθον |
| | | γεγράμμεθα | γέγραφθε | γεγραμμένοι, εἰσί |
| | | ἐδήλωσα | ἐδήλωσας | ἐδήλωσε |
| | | | ἐδηλώσατον | ἐδηλωσάτην |
| | | ἐδηλώσαμεν | ἐδηλώσατε | ἐδήλωσαν |
| | | ἐδηλώθην | ἐδηλώθης | ἐδηλώθη |
| | | | ἐδηλώθητον | ἐδηλωθήτην |
| | | ἐδηλώθημεν | ἐδηλώθητε | ἐδηλώθησαν |
| | | δεδήλωκα | δεδήλωκας | δεδήλωκε |
| | | | δεδηλώκατον | δεδηλώκατον |
| | | δεδηλώκαμεν | δεδηλώκατε | δεδηλώκασι |
| | | δεδήλωμαι | δεδήλωσαι | δεδήλωται |
| | | δεδηλώμεθον | δεδήλωσθον | δεδήλωσθον |
| | | δεδηλώμεθα | δεδήλωσθε | δεδηλωμένοι, εἰσί |

The 1st aorist act. is formed from the future by changing ω into α and prefixing the augment.

The first aorist pass. is formed from pres. act. by changing ω into θην, making the proper euphonic changes with the last letter of root and prefixing augment.

The perfect active is formed by adding κ or κα to root of present (with proper euphonic changes) and prefixing reduplication.

The perf. pass. is formed by adding μαι to root of pres. act. (making euphonic changes) and prefixing reduplication.

| | | | M. | F. | N. |
|---|---|---|---|---|---|
| 3. | Sing. | N. | οὗτος | αὕτη | τοῦτο |
| | | Ac. | τοῦτον | ταύτην | τοῦτο |
| | | G. | τούτου | ταύτης | τούτου |
| | | D. | τούτῳ | ταύτῃ | τούτῳ |
| | Dual. | N. Ac. | τούτω | ταύτα | τούτω |
| | | G.D. | τούτοιν | ταύταιν | τούτοιν |
| | Plur. | N. | οὗτοι | αὗται | ταῦτα |
| | | Ac. | τούτους | τούτων | ταῦτα |
| | | G. | τούτων | ταύταις | τούτων |
| | | D. | τούτοις | ταύτας | τούτοις |

| | Sing. | Dual. | Plural. |
|---|---|---|---|
| N. | ἐγώ | | Ac. ἡμεῖς |
| Ac. | ἐμέ μέ | N.Ac. νώ | N. ἡμᾶς |
| G. | ἐμοῦ μοῦ | G.D. νῷν | G. ἡμῶν |
| Dat. | ἐμοί μοί | | D. ἡμῖν |

| | | M. | F. | N. |
|---|---|---|---|---|
| Sing. | N. | τοσοῦτος | τοσαύτη | τοσοῦτο |
| | Ac. | τοσοῦτον | τοσαύτην | τοσοῦτο |
| | G. | τοσούτου | τοσαύτης | τοσούτου |
| | D. | τοσούτῳ | τοσαύτῃ | τοσούτῳ |
| Plur. | N. | τοσοῦτοι | τοσαῦται | τοσαῦτα |
| | Ac. | τοσούτους | τοσαύτας | τοσαῦτα |
| | G. | τοσούτων | τοσούτων | τοσούτων |
| | D. | τοσούτοις | τοσαύταις | τοσούτοις |
| Dual. | N.Ac. | τοσούτω | τοσαύτα | τοσούτω |
| | G.D. | τοσούτοιν | τοσαύταιν | τοσούτοιν |

| | Sing. | Dual. | Plur. |
|---|---|---|---|
| N. | σύ | | ὑμεῖς |
| Ac. | σέ | N.Ac. σφώ | ὑμᾶς |
| G. | σοῦ | G.D. σφῷν | ὑμῶν |
| D. | σοί | | ὑμῖν |

4.

| Gen. | Dat. | Acc. |
|---|---|---|
| παρά (motion) from alongside of | alongside of | (motion) alongside of |
| πρός (motion) from | near | (motion) towards |
| ὑπό by (agent) | under | (motion) under |
| περί around about, concerning | around (rest) | (motion) around |

So generally with all prepositions; the acc. denotes motion, the dat. denotes rest, and the gen. denotes motion from.

5. ἐκεῖ there. πῆ where, etc. etc.
(*a*) The termination θι means at.
(*b*) ,, ,, δε ,, to
(*c*) ,, ,, θεν ,, from
as (*a*) οἴκοθι, at one's house; (*b*) οἴκαδε, to one's house; (*c*) οἴκοθεν, from one's house.

## FIRST YEAR.

MALE AND FEMALE CANDIDATES.

### French.

SECTION I.

1. Translate into English:—

(*a*) Un jour, à l'heure prescrite, Charney se promenait dans son préau, la tête baissée, les bras croisés derrière le dos, marchant pas à pas, lentement, doucement, comme pour agrandir l'étroite carrière qu'il lui était permis de parcourir. Le printemps s'annonçait: un air plus doux dilatait ses poumons, et vivre libre, maître du terrain et de l'espace, lui semblait bien désirable alors. Il comptait un à un les pavés de sa petite cour, sans doute pour vérifier l'exactitude de ses anciens calculs, car il n'était pas à les nombrer pour la première fois, quand il apergoit, là, devant lui, sous ses yeux, un faible monticule de terre légèrement soulevé entre deux pavés, et divisé béant à son sommet.

(*b*) Picciola! c'est le nom qu'il lui a donné lorsque, dans le besoin d'entendre une voix humaine retentir à son oreille au milieu de ses travaux, il converse hautement avec sa campagne de captivité, en l'entourant de ses soins. 'Povera Picciola!' telle a été l'exclamation de Ludovic s'apitoyant sur la pauvre petite, qui avait failli mourir faute d'être arrosée. Charney s'en était souvenu. Un matin que, à l'heure de sa promenade habituelle, il interroge Picciola feuille par feuille, ses yeux

s'arrêtent fixement tout à coup sur une des parties du végétal, et son cœur bat avec force. Il y porte la main et rougit. Depuis longtemps il n'a éprouvé une émotion aussi vive. C'est qu'il vient de voir, au sommet de la tige principale, une excroissance inaccoutumée, verdâtre, soyeuse, de forme sphérique, imbriquée de légères écailles placées les unes sur les autres comme les ardoises au dome arrondi d'un élégant kiosque.—Il n'en peut douter, c'est là le bouton! La fleur n'est pas loin.

2. Parse—prescrite, derrière, semblait, apergoit, yeux, pour (before agrandir) de (before parcourir), retentir, travaux, faillir, arrosée, en souvenu, soyeuse.

## ANSWERS.

1. (*a*) One day, at the prescribed hour, Charney was walking in his court-yard, with his head bent, and his arms crossed behind him—walking step by step, slowly, gently, as if to widen the narrow space which he was allowed to perambulate. Spring was beginning to appear; a milder air inflated his lungs, and it seemed to him then very desirable to be free, and master of the ground and space. He was counting one by one the paving-stones of his little court, doubtless in order to verify the accuracy of his former calculations, for this was not the first time he had counted them, when he perceived before him a tiny hillock of soil, slightly raised between two stones, and gaping open at the top.

(*b*) Picciola! that was the name he had given it, when, in his need of hearing a human voice in the midst of his labours, he talked aloud with the companion of his captivity, whilst surrounding it with his cares. 'Povera Picciola!' (poor little one!), such had been Ludovic's exclamation when moved to pity by the poor little plant, which had nearly died for want of being watered. Charney had remembered it. One morning, when examining Picciola, leaf by leaf, during the hour of his usual exercise, his eyes were suddenly arrested by one part of the plant, and his heart beat violently. He touched it with his hand, and the colour came into his face. It was long since he had experienced such keen emotion; for what he had just seen was an unusual excrescence at the top of the main stem, of a greenish hue, silky, round in shape, overlapped with delicate scales, placed one over the other, like slates on the rounded dome of a graceful kiosk. He could have no doubt about it; it was the bud. The flower was not far off.

2. *Prescrite*—perfect participle of the verb *prescrire*, used adjectively; feminine singular, qualifying *heure*.
*derrière*—preposition, governing *dos*.
*semblait*—imperfect mood, indicative tense of the intransitive verb *sembler*, 1st conjugation, 3rd person singular, agreeing with its verbal subject, *vivre libre*.
*apergoit*—indicative mood, historic present tense of the transitive verb *apercevoir*, 3rd conjugation, 3rd person singular, agreeing with its subject *il*.
*yeux*—common noun, masculine gender, 3rd person, plural number of *œil*, objective case, governed by the preposition *sous*.
*pour*—conjunction.
*de*—preposition, governed by the verb *permettre*, which requires *de* before the infinitive which follows.
*retentir*—infinitive present of intransitive verb *retentir*, 2nd conjugation, governed by the verb *entendre*.
*travaux*—common noun, 3rd person, plural of *travail*, masculine gender, objective case, governed by the preposition *de*.
*faillir*—infinitive present of the defective verb *faillir*, 2nd conjugation, used only in the *infinitive*, *past definite*, and *compound tenses*.
*arrosée*—perfect participle of the transitive verb *arroser*, 1st conjugation, feminine singular, agreeing with the subject of the sentence *qui* (relative to its antecedent *petite*).
*en souvenu*:
*en*—personal pronoun, indirect object of *se souvenir*.
(*s'en était*) *souvenu*—indicative pluperfect of the pronominal verb *se souvenir*, 2nd conjugation, 3rd person singular, agreeing with its subject *Charney*.
*soyeuse*—qualificative adjective, feminine gender, qualifying *excroissance*.

*(To be continued.)*

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